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IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OKLAHOMA

STATE OF OKLAHOMA, ex rel,)
W.A. DREW EDMONDSON, in his)
capacity as ATTORNEY GENERAL)
OF THE STATE OF OKLAHOMA,)
et al.)

Plaintiffs,)

vs.)

CASE NO. 05-CV-329-GKF-PJC

TYSON FOODS, INC., et al.,)

Defendants.)

TRANSCRIPT OF PROCEEDINGS
JULY 28, 2009
BEFORE THE HONORABLE GREGORY K. FRIZZELL, DISTRICT JUDGE
MOTION HEARING, VOLUME I

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PROCEEDINGS

JULY 28, 2009:

THE COURT: Ladies and gentlemen, after reviewing this matter -- go ahead, I'm sorry, call the case.

THE CLERK: We're here in the matter of the State of Oklahoma v. Tyson Foods, Inc., Case No. 05-CV-329-GKF. Parties please enter their appearance.

MR. BULLOCK: Louis Bullock for the State of Oklahoma.

THE COURT: Good morning.

MR. NANCE: Bob Nance for the State of Oklahoma.

MS. FOSTER: Kelly Foster for the State of Oklahoma.

MR. RIGGS: David Riggs for the State of Oklahoma.

MR. PAGE: David Page for the State of Oklahoma.

MR. GARREN: Richard Garren for the State of Oklahoma.

MR. BAKER: Fred Baker for the State of Oklahoma.

MS. XIDIS: Claire Xidis for the State of Oklahoma.

MR. SANDERS: Bob Sanders for the Cal-Maine defendants.

MR. TUCKER: John Tucker for Cargill defendants.

MR. RYAN: Pat Ryan, Tyson defendants.

MR. BASSETT: Woody Bassett and Vince Chadick for the George's defendants.

MR. ELROD: John Elrod and Vicki Bronson for Simmons.

1 MR. McDANIEL: Your Honor, Scott McDaniel, Nicole
2 Longwell and Philip Hixon here for Peterson Farms.

3 MR. JORGENSEN: Jay Jorgensen and Gordon Todd for the
4 Tyson defendants.

5 MR. GEORGE: Robert George for the Tyson defendants.

6 THE COURT: Mr. Jorgensen, it's Gordon who with you?

7 MR. JORGENSEN: I'm sorry, Gordon Todd.

8 MR. TODD: Todd, T-O-D-D.

9 THE COURT: I don't believe you've been with us
10 before, have you, sir?

11 MR. TODD: I have not, Your Honor.

12 THE COURT: Very well. Welcome.

13 MR. TODD: Thank you.

14 MS. HILL: Theresa Hill for the Cargill defendants.

15 MS. KLEIBACKER: Krisann Kleibacker Lee for the
16 Cargill defendants. It's also my first time to appear before
17 Your Honor.

18 THE COURT: Welcome.

19 MR. EHRLICH: Dale Ehrlich for the Cargill defendants.

20 MR. CHADICK: Your Honor, I'm Vince Chadick, who
21 Mr. Bassett referred to. First time here. Thank you.

22 MR. REDEMANN: Robert Redemann for the Cal-Maine
23 defendants.

24 THE COURT: Welcome all. Having gone through these
25 rather voluminous, I think now, what, 17, 18, 19 Daubert

1 motions, I believe Mr. Bullock was right in his statement to
2 the Court in the telephone hearing that the Court needed to
3 address each and every one of these Daubert motions. They're
4 tied together. I don't know that we can, for efficiency sake,
5 as we discussed in the earlier hearing, decide one that's
6 related and not the others. I think we would probably commit
7 error, or I guarantee you, one of you, depending whose ox is
8 gored, would claim that I committed error. So we're not going
9 to do that.

10 We're going to decide each and every one of these
11 Daubert motions. We're going to entertain argument on all of
12 them. We're going to reserve our ruling. And as you all have
13 pointed out, it is incumbent upon the Court under Tenth Circuit
14 law to enter detailed findings and conclusions with regard to
15 each one of these.

16 So we're going to group them together. We'll hear
17 the motion. Give me a little time to put together my
18 thoughts. We're going to enter these findings and conclusions,
19 whatever they may be, on the record.

20 Now, as to the first set for Watershed Modeling ,
21 it's very clear to me that -- and I may be wrong, so correct me
22 if I am. So going back just a step here. I apologize.
23 Mr. Bullock had obviously put more thought into this and was
24 trying to help the Court in conceptualizing all of this.

25 And you're entirely right, Mr. Bullock; I think all

1 of them need to be decided.

2 With regard to Watershed Modeling, Bierman and Engel
3 are the only two, correct?

4 MR. PAGE: That's correct, Your Honor.

5 MR. GEORGE: That's correct, Your Honor.

6 THE COURT: So we'll hear those two.

7 Now, with respect to Harwood, I noticed one omission
8 in terms of the grouping. And I know these are all difficult
9 because there are so many of them, but Cowan also pertains to
10 Harwood. So I believe Cowan has to be heard in connection with
11 the Harwood matters.

12 MR. TODD: I think that's correct. I'm not sure the
13 plaintiffs' motion as to Dr. Cowan actually addressed Dr. --
14 I'm not sure the motion to Dr. Cowan addressed the Harwood
15 portion of this report. If I'm wrong about that --

16 THE CLERK: She would like to know your name.

17 MR. TODD: Oh, sorry. Gordon Todd.

18 THE COURT: Mr. Todd didn't realize, Terri Beeler is
19 our court reporter for the very first time today, and she
20 doesn't know all of you like Glen does. Terri will be with us
21 throughout the trial because she can provide daily copy. Glen
22 was not going to be able to do that. As you all know, we had
23 to have another set of court reporters in here to provide daily
24 copy.

25 So as she is working on her set of -- her dictionary,

1 in her machine, please be careful in pronouncing these words.
2 I guarantee you she's very, very good at what she does. But
3 she needs to build up that glossary within her machine so
4 she'll be able to get all of these words: Brevibacterium,
5 etcetera.

6 Mr. Page.

7 MR. PAGE: Thank you, Your Honor. With regard to
8 Mr. Cowan, our challenge to Dr. Cowan is based on his overall
9 ability to offer an opinion on any statistical matter in an
10 environmental case.

11 THE COURT: I thought so. I think Cowan has to be
12 brought in with regard to Harwood, if we're going to address
13 Harwood first.

14 Nice picture in the paper this morning, Mr. Riggs.

15 MR. RIGGS: Thanks to you.

16 THE COURT: No thanks to me. I apologize. I just
17 call them like I see them. You know, that's one of the things
18 about this job; you have the luxury of calling them the way you
19 see them. You don't always get them right, or at least the
20 Tenth Circuit doesn't always think you call them right, but
21 that's the beauty of this system. With a lifetime tenure,
22 frankly, you have the luxury of being able to call them like
23 you see them so you can look yourself in the mirror the next
24 morning. So I don't promise that we'll get them right. We'll
25 just call them the way we think they're right.

1 With regard to Harwood, any others that have to be
2 decided in that group?

3 MR. JORGENSEN: Your Honor, on the call, I think we
4 mentioned 2090, which is about bacterial holding times. I'm
5 sorry, my name is Jay Jorgensen.

6 THE COURT: Yes, sir. We've got 2090, which is
7 clearly within this group that Mr. Bullock put together for us
8 here. So 2028, 2090, 2072. Any others that need to be decided
9 in connection with the Harwood group?

10 All right. Hearing none, before we get into Bierman
11 and Engel, I do want to raise one matter. As you saw in the
12 Court's order of Friday, we were -- it was very difficult to
13 try to correlate the most recent declaration of Fisher to the
14 earlier expert report. So we asked the plaintiffs to basically
15 correlate those for us, and what we got was an entirely third
16 document.

17 So my clerks are, as we speak -- no, I'm sorry, not
18 as we speak; she's right here. What we're having to do is take
19 the declaration and the original report and now a third
20 document and try to put them all together.

21 Now, you realize with this army and your various
22 paralegals, you can do that; you can order it done. We've got
23 two people here dealing with all of you. So the easier you can
24 make this on us, the better it is.

25 We will do this, but basically what we were trying to

1 accomplish -- and maybe it wasn't clear -- was we were trying
2 to overlap the recent, for instance, Fisher declaration with
3 the earlier expert report and decide if anything was new or if
4 it all related back to the original.

5 This, arguably, muddies the water even more. And I
6 know it wasn't the intention, but basically we're now having to
7 go to three documents.

8 Mr. Bullock.

9 MR. BULLOCK: Well, Judge, and I apologize for that.
10 We -- trying to live with the deadline, of course, retyping the
11 report --

12 THE COURT: If you want to give up your trial date,
13 that's fine.

14 MR. BULLOCK: No, I'm not arguing on that. I'm just
15 giving my apologies to the Court in terms of we tried to get
16 you the clearest document we could within the time from Friday
17 until Monday. And if it's unclear, we certainly are willing to
18 put our shoulder back to it and do some more on it because we
19 do want to be helpful. It wouldn't make any sense to file
20 anything that you didn't think would be helpful.

21 THE COURT: I have not laid eyes on it, but I'm told
22 that what was filed was about that thick (indicating). So I
23 don't know how that is helpful in trying to understand what in
24 the new declaration is identical or overlaps with that which
25 was timely filed.

1 In any event, we're going to put our shoulder to the
2 wheel. I'm not going to ask for any more filings because,
3 frankly, it seems to hurt more than help. As you all know,
4 we're under deadlines, too, and we're trying to meet those.

5 It also appears that with regard to the Olsen group,
6 I've got to decide the motion to strike with regard to the
7 Fisher declaration that pertains to the Olsen Daubert motion,
8 correct?

9 MR. GEORGE: I believe that is correct, Your Honor.

10 THE COURT: So we're going to really put our shoulder
11 to the wheel and try to figure out what in the new Fisher -- or
12 the most recent Fisher declaration is new, if anything, and
13 what simply relates back.

14 And, frankly, as you can see from one of my orders
15 yesterday, there are declarations here. The Fisher declaration
16 that we discussed in the order yesterday, it was merely a
17 reiteration of what -- that which was timely filed before.

18 So, unfortunately, it takes a particularized eye in
19 looking at each and every statement to determine if anything is
20 new and what simply relates back to the original.

21 MR. BULLOCK: Judge.

22 THE COURT: Yes, sir.

23 MR. BULLOCK: Could we be heard briefly on your order
24 of Friday? Would you entertain --

25 THE COURT: We've got enough to deal with going

1 forward. I don't know -- you know, we've got 17 motions, or 18
2 in the next 12 hours. And I don't know how we go back and
3 replot ground and get done what we have on our plate in the
4 next two days.

5 Mr. Bullock.

6 MR. BULLOCK: Well, I think that it is critical that
7 we get this right. I think the Court agrees with us on that.

8 THE COURT: We can spend two days just on replowing
9 2141.

10 MR. BULLOCK: But I think there's some fundamental
11 propositions there that we would like to clarify with the
12 Court, if we could.

13 THE COURT: Frankly, I'm not prepared to do that.
14 I've got 17 motions that I've tried to get up to speed with,
15 and I've put behind 2141. I don't have it, frankly, on my
16 agenda here today.

17 If you care to do that, focus on that which you're
18 most serious about, file it in a motion and we'll look at it.

19 Let's hear Bierman and Engel.

20 MR. NANCE: Your Honor, if I may, just by way of
21 introduction, we have present in the courtroom today Oklahoma
22 Secretary of the Environment, J.D. Strong. It's his first
23 appearance in your court.

24 THE COURT: Welcome, sir.

25 Mr. George.

1 MR. GEORGE: Thank you, Your Honor. Robert George
2 appearing for the Tyson defendants. And, Your Honor, I do have
3 a few PowerPoint slides that I may use at a couple of places to
4 try to bring some focus on my part as much as anything to the
5 discussion. And, Your Honor, if you prefer to have a hard copy
6 of those slides, I certainly have those available; will make
7 them available to the Court. So let me hand those up just in
8 case.

9 THE COURT: Thank you very much. And before we get
10 started, there's one flier motion out there on Taylor, number
11 2078, that is not contained in the groupings suggested by the
12 plaintiff. I take it we will take that up at the tail end of
13 these proceedings?

14 MR. ELROD: That's fine with us, Your Honor. I'll be
15 arguing Taylor.

16 THE COURT: Thank you very much.

17 Mr. George.

18 MR. GEORGE: Your Honor, for the record, there's a
19 motion that I believe the Court had indicated in this grouping
20 we would take up first is motion docket No. 2056, which is the
21 Daubert motion pertaining to plaintiffs' expert Bernard Engel,
22 who is the watershed modeler. So, Your Honor, my remarks will
23 focus on that motion.

24 Dr. Engel, Your Honor, is a man with many opinions,
25 as I'm sure you appreciate, having had an opportunity to at

1 least thumb through his report. His report is about 300 pages
2 long, if you count the appendices. And, Your Honor, for the
3 most part, Dr. Engel, in his report, does what is commonplace
4 and typical in environmental cases; and that is that he reviews
5 data and performs analysis on either statistics or
6 environmental sampling data. And this is that sort of common
7 fare that you see regularly in environmental litigation.

8 But, Your Honor, the particular issues that this
9 Daubert motion focuses on are those that relate to chapter 10
10 of his report.

11 THE COURT: Only.

12 MR. GEORGE: Only, Your Honor. And in chapter 10 of
13 his report is where Dr. Engel departs from the typical of
14 reviewing environmental sampling data and performing analysis,
15 and in chapter 10 is where he describes some work that he and a
16 postdoctoral student by the name of Dr. Ji-Hong did with some
17 computer models.

18 And, Your Honor, in chapter 10 of his report,
19 Dr. Engel offers some conclusions that he has drawn based not
20 upon field measurements or sampling data but, rather, based
21 upon predictions that are generated by a computer model that
22 try to simulate either unwitnessed events in the past or events
23 to occur in the future.

24 And based upon the output of those computer models,
25 Dr. Engel claims that he can do several things with respect to

1 making predictions.

2 And the first slide, Your Honor, sort of summarizes
3 those, and they fall into three broad groups.

4 First of all, Dr. Engel believes that from his
5 computer model, he can simulate what has caused what in terms
6 of phosphorus loads in the past 55 years in the watershed.

7 So, for example, Your Honor, he offers the opinion
8 that since 1954, phosphorus loads to Lake Tenkiller have
9 increased 8,000 pounds per year, and 4,700 pounds of that
10 increase, according to Dr. Engel, is caused by poultry litter
11 applications.

12 Well, we don't have environmental sampling data going
13 back to 1954, and so this is an extrapolation from his model.

14 The second group of opinions that Dr. Engel offers
15 relate to the past. And this is sort of an alternative
16 universe that Dr. Engel has created in his modeling framework,
17 and he is purporting to offer opinions about what Lake
18 Tenkiller would look like today if poultry litter had never
19 been applied in this watershed.

20 And then the last group of opinions, Your Honor,
21 relate to predictions about what will happen to phosphorus
22 loads in Lake Tenkiller in the future, in the next hundred
23 years. And Dr. Engel runs a host of different scenarios as to,
24 you know, what would happen in certain events depending upon
25 either changes in poultry litter or other circumstances in the

1 watershed.

2 So what Dr. Engel wants to do at trial, Your Honor,
3 is to present the Court with charts and graphs such as those
4 that appear on slide 2 and slide 3, where he takes the output
5 from his model and he presents it as a representation of
6 reality. And he wants the Court to accept as reliable his
7 opinions not based upon data but his opinions based upon what
8 the model has told him either has happened or might happen in
9 the future.

10 Your Honor, all of us have helpful lawyer friends,
11 and I have one who I have talked through the years and is aware
12 of my involvement in this case and has some sense as to the
13 flavor of the issues, and my friend sent me a book review out
14 of *American Scientist*. He's more intelligent than I.
15 Apparently he subscribes to *American Scientist*.

16 THE COURT: And has the time.

17 MR. GEORGE: And has the time; correct, Your Honor.

18 But the title of the book caught his eye, as it did
19 mine; and the title was *Useless Arithmetic: Why Environmental*
20 *Scientists Can't Predict The Future*. And, Your Honor, I'll
21 confess I haven't had time to read the book, but I have had
22 time to read the book review of the *American Scientist*. And I
23 won't read you all of it, but there is a paragraph that I think
24 kind of sets the stage for our discussion. And if the Court
25 will indulge me just for a moment.

1 The reviewers at *American Scientist* talking about the
2 fallacies of relying upon computer models to the exclusion of
3 other things say this: "With modern computers, it's now
4 possible for a graduate student or a practicing engineer to
5 acquire a very complex computer code hundreds of thousands of
6 lines long, worked over by several preceding generations of
7 scientists with a complexity so great that no single individual
8 actually understands either the underlying physical principles
9 or the behavior of the computer code or the degree to which it
10 actually represents the phenomenon of interest. These codes
11 are accompanied by manuals explaining how to set them up, how
12 to run them, often with very long lists of default parameters.
13 Sometimes they represent the coupling of two or more
14 submodels. Each one appears well understood but whose
15 interaction can lead to completely unexpected behavior as when
16 a simple pendulum is hung on the end of another simple
17 pendulum."

18 And, Your Honor, I think that description is exactly
19 what has happened in this case. Dr. Engel had a 25-year-old
20 postdoctoral student by the name of Dr. Ji-Hong who was working
21 with him at Purdue University, he had this individual set up
22 and run a computer model, computer code, and that model
23 produced results or predictions about what might happen in
24 various scenarios.

25 Dr. Ji-Hong is the person who performed most of the

1 work relating to the modeling in this case. He set up the
2 model. He ran the model. He was involved in interpreting the
3 results of the model. He was involved in deciding how to
4 allocate the phosphorus predictions from the model back to
5 various sources, including poultry litter.

6 And, Your Honor, if Your Honor has time to read
7 certain portions of the deposition testimony from Dr. Engel,
8 there's one section I'd like to draw the Court's attention to,
9 and it's in Exhibit 2, his deposition transcript. But there
10 are about 54 pages, Your Honor, and I apologize for the length,
11 but pages 337 through -91, Your Honor, will give the Court some
12 flavor as to the difficulty that the defendants have had in
13 getting Dr. Engel to explain the work done by his colleague.

14 Your Honor, for about three and a half hours in that
15 section of the deposition, I asked Dr. Engel to explain how he
16 came up with his percentages that we showed earlier of 45
17 percent or 59 percent of the phosphorus load being allocated to
18 poultry litter using the model results from Dr. Ji-Hong.

19 And, Your Honor, during the course of that three and
20 a half hours, I got very few answers. Dr. Engel admitted that
21 these figures, these percentages, were not explained in his
22 report. He admitted that Dr. Ji-Hong performed part of the
23 allocations, and he could not tell the defendants the modeling
24 scenarios that were used in these allocations.

25 When I presented Dr. Engel with the spreadsheets that

1 appeared to have been used by Dr. Ji-Hong in coming up with
2 these percentages -- it's Exhibit 16 that's referenced in the
3 transcript -- he was unable to identify the source of the data
4 on those spreadsheets. And for about three and a half hours,
5 Your Honor, his common answers to questions about his most
6 basic and central opinion were "I'm not certain" or "I don't
7 want to speculate."

8 And, Your Honor, there's still a lot of unanswered
9 questions with respect to what Dr. Engel did and what
10 Dr. Ji-Hong did in arriving at some of the opinions that are
11 offered in this case. His methods and opinions are not very
12 well explained as it relates to the modeling. But one thing we
13 do know, Your Honor, is that Dr. Engel has twice now put
14 forward statements of opinions that he was prepared to come
15 into this court and testify under oath that were accurate and
16 reliable, only to have to withdraw that work entirely due to
17 substantial errors identified not by himself or not by
18 Dr. Ji-Hong but by the defense expert Dr. Bierman.

19 The original report which is attached as Exhibit 1 to
20 the motion, Your Honor, was issued on May 22nd in keeping with
21 this Court's deadline. The first errata came September the 4th
22 of 2008. And, Your Honor, that errata came after Dr. Engel was
23 notified by Dr. Bierman, the defense expert, that there were
24 substantial discrepancies between the computer files that were
25 produced and the discussion of the modeling results in his

1 report.

2 And at the beginning of that first errata which is
3 Exhibit 4 to the motion, Dr. Engel explains what happens. And
4 to boil it down, Your Honor, Dr. Engel claims that he wrote his
5 original report using something other than the final computer
6 runs and -- due to some miscommunication between himself and
7 Dr. Ji-Hong.

8 And so, Your Honor, in the first errata, we have an
9 entire replacing of 48 pages of chapter 10 of Dr. Engel's
10 report. Well, the changes or errors -- error corrections were
11 not done.

12 In October of 2008, the second errata was issued by
13 Dr. Engel, and this is Exhibit 5. And once again, Your Honor,
14 the sequence of events is not that Dr. Engel evaluated his work
15 and determined an error but, rather, the defendants pointed out
16 to Dr. Engel that there were some tables in his report that
17 appeared to have the wrong USGS loads where he was comparing
18 his model predictions to USGS data. And lo and behold,
19 Dr. Engel acknowledged that that was correct, that he had made
20 a mistake. And he issued another errata to correct that, this
21 time several pages long, replacing eight tables and figures
22 which he now says have the correct loads.

23 Your Honor, I give all that not just for background
24 but as a word of caution, Your Honor. Given what the
25 defendants have uncovered and the mistakes that have already

1 been admitted by Dr. Engel as it relates to the modeling work,
2 the defendants believe that this Court should be cautious about
3 placing any confidence in the work done by Dr. Engel and
4 Dr. Ji-Hong.

5 Now, Your Honor, I want to turn to sort of the
6 standard Daubert analysis based upon the opinions that are
7 currently before the Court. As this Court is well aware, one
8 factor under the Daubert analysis is whether the methodology
9 employed in arriving at conclusions has been generally accepted
10 in the scientific community.

11 And candidly, Your Honor, you'll see a little bit of
12 a struggle between the defendants and the plaintiffs in the
13 hearing today to define what Dr. Engel's methodology is. And I
14 believe it would be fair to say that the plaintiffs' position
15 is that Dr. Engel's methodology is the use of a GLEAMS model,
16 and that GLEAMS is a model that has been widely used and,
17 therefore, his methodology must be generally accepted in the
18 scientific community. But the truth, Your Honor --

19 THE COURT: Well, you're not contesting the GLEAMS
20 model. You're contesting the phosphorus routing model.

21 THE WITNESS: We're contesting certain aspects of the
22 way the GLEAMS model was set up and applied to this site.
23 We're not contesting the fact that the GLEAMS model is a model
24 that is commonly employed at a field scale and -- by certain
25 environmental engineers in evaluating at the field scale

1 losses.

2 So we do have a dispute, Your Honor, in this case as
3 to whether GLEAMS model should have been applied to a
4 watershed. But certainly, Your Honor, your comments are on
5 point that there's more to Dr. Engel's methodology. And, in
6 fact, if we'll go to the next slide --

7 THE COURT: Has the GLEAMS model ever been applied to
8 a watershed? You come short of saying that in your brief. You
9 simply say that it should be applied to a smaller locale.

10 MR. GEORGE: Correct.

11 THE COURT: But I take it by omission, you're
12 admitting that it has been applied to watersheds, albeit
13 smaller watersheds.

14 MR. GEORGE: That's correct, Your Honor.

15 THE COURT: So then you don't contest that it can be
16 applied to a watershed, even large watersheds, as long as
17 enough work has been done to input data, right?

18 MR. GEORGE: I think it would depend on how we define
19 "large." It is the defendants' view that GLEAMS was never
20 intended for and doesn't have the programing to support the
21 application of a modeling exercise across a million acres. It
22 simply was not intended for that purpose. It has never been
23 used on any watershed of that scale as we've been able to
24 identify in our research, and Dr. Engel was unable to provide
25 an example of that.

1 THE COURT: Do you have an expert to say that it was
2 never programmed to handle a bigger watershed?

3 MR. GEORGE: Well, in fact, Your Honor, if you look
4 at -- Jay, could you go to slide number -- I apologize, we're
5 going to jump around a little bit. These questions are
6 helpful, Your Honor.

7 Slide 7. Your Honor, the EPA has conducted --
8 because they're probably the most frequent users of models,
9 they have conducted a review of the appropriate application of
10 certain models. And what I've put on the screen, Your Honor,
11 and what is in your materials is Exhibit No. 7 to our motion.
12 And here we have a report in 2005 by EPA where they have
13 commissioned work by scientists to evaluate a whole host of
14 models. This is not just GLEAMS. But in this report, there's
15 an appendix that relates to various models. And EPA has asked
16 for recommendations by people that are familiar with the models
17 as to what are the limitations in terms of use of the GLEAMS --
18 of certain models.

19 And this particular appendix relates to the GLEAMS
20 model. You'll see it right there on your screen, Your Honor.
21 The fact sheet, as it's called by EPA terminology for GLEAMS, I
22 think is pretty straightforward and answers Your Honor's
23 question.

24 And on page 7, it says the model areas that are
25 supported, watershed, low. So there's low support for this

1 model for watershed application; receiving water, none; then
2 air, ground water are obviously not relevant in this case. But
3 importantly, Your Honor, on page 8, EPA notes some express
4 limitations for this model. And those limitations, I think,
5 answer Your Honor's question.

6 First of all, EPA says that it's limited to an
7 agriculture field of very small size. Clearly the Illinois
8 River Watershed is not an agricultural field of a very small
9 size. It's not suited for bigger watersheds and it's not
10 suited for urban land uses. Your Honor, it's a field scale
11 model.

12 And certainly there are instances in which, you know,
13 people make fields bigger in field scale models and they use
14 these models, you know, beyond maybe a 40-acre tract, but it
15 was not intended to be the platform or a modeling exercise of
16 the scope that Dr. Engel has used it in this case. So,
17 Your Honor --

18 Jay, can you go back to the slide -- slide 6. So if
19 you go back to the methodology which is at issue with respect
20 to Dr. Engel, Your Honor, I put a little schematic that I had
21 to put together to help me to frame my thinking on this. This
22 is Dr. Engel's methodology. Dr. Engel's methodology involves a
23 lot more than GLEAMS. But GLEAMS is the starting point.
24 That's the beginning in the chain of events that lead to his
25 opinions.

1 And so, Your Honor, with respect to Dr. Engel's
2 methodology, it really was doomed from the start because the
3 model that he chose as the platform, GLEAMS, is not appropriate
4 for a watershed of this size.

5 But that's not the end of our concerns regarding
6 Dr. Engel's methodology. You go to the next step, Your Honor,
7 once you've got a model, you've got this computer code that the
8 modelers, in this case Dr. Ji-Hong, have to decide how to set
9 up or configure that model because it doesn't come programmed
10 for the Illinois River Watershed, and the model doesn't know
11 exactly what questions you're going to answer. So you kind of
12 have to build in some assumptions about land use and sources.
13 And you have to characterize different sources. You have to
14 select default parameters to run the computer code as they
15 relate to soil test phosphorous and a whole host of
16 environmental factors.

17 And, Your Honor, we, the defendants, have some
18 serious problems with the manner in which the model setup was
19 completed in this case. And, of course, Your Honor, the test
20 needs to be that your simulation matches up, to the degree
21 possible, with the world that you're simulating.

22 So in this case, Dr. Engel is trying to simulate the
23 effects of the land application of poultry litter on the
24 Illinois River Watershed, and so it's important in setting up
25 this model that Dr. Engel and Dr. Ji-Hong exercise care to

1 establish a modeling construct that resembles reality in this
2 case. And, Your Honor, they simply didn't even come close.

3 In the real world of the Illinois River Watershed, as
4 Your Honor is aware, there are thousands of different parcels
5 of land with different soil types, different soil test
6 phosphorus levels, different types of vegetation, different
7 slopes. Each parcel of land has a different history in terms
8 of its land use. The GLEAMS model is just not configured in a
9 way to allow that level of complexity.

10 So what Dr. Ji-Hong and Dr. Engel had to do, Your
11 Honor, is that they simplified. They divided the Illinois
12 River Watershed up into 50 large fields. This million acres
13 was divided into 50 large fields that they call hydrologic
14 response units, or HRUs.

15 And they gave in the modeling framework each HRU a
16 homogenous set of characteristics. So HRU No. 1 has the same
17 -- all of the fields in that unit, that could be up to 100,000
18 acres, has the same soil test phosphorus, has the same
19 vegetation, has the same history in terms of land use. And
20 that's the way the modeling sees that swath of land within the
21 modeling framework.

22 Now, the second thing that Dr. Ji-Hong and Dr. Engel
23 had to do is they had to select which phosphorus sources that
24 they were going to model across this landscape. And they made
25 some decisions, and some of which the defendants are critical

1 of. They chose not to model cattle, for example. There is
2 some attempt on the back end of the modeling to try to deal
3 with cattle, but they didn't model the impacts of cattle on
4 phosphorus. They didn't model contributions from septic tanks,
5 they didn't model phosphorus that reaches the streams from
6 stream bank erosion, so on and so forth.

7 Obviously, Your Honor, the source that is of greatest
8 interest in this case is poultry litter. So it's important
9 that the Court consider whether or not, when it comes to
10 poultry litter, the defendants -- I'm sorry, the doctors,
11 Dr. Engel and Dr. Ji-Hong, properly characterize litter
12 application in this watershed.

13 Your Honor, there's some things we don't know about
14 poultry litter applications in this watershed. But there are
15 some things that are known and that Dr. Engel has reported in
16 his own expert report. And the reality of what he says in
17 other parts of his report about what is happening with poultry
18 litter compared to how he and Dr. Ji-Hong describe poultry
19 litter in their model is pretty striking, and I want to run
20 through just a few of them, Your Honor.

21 First of all, the size of poultry litter. Dr. Engel
22 has computed elsewhere in his report that there's 354,000 tons
23 of poultry litter that is generated on farms in the Illinois
24 River Watershed each year.

25 And the assumption that Dr. Engel and Dr. Ji-Hong

1 made in their modeling is that every pound of that poultry
2 litter that's generated in the watershed gets land applied in
3 the watershed. And, you know, we could all quarrel with that.
4 And the defendants obviously disagree that that's the reality
5 of what happens.

6 But, Your Honor, there's really no disagreement here
7 between the plaintiffs and the defendants; it's a disagreement
8 between Dr. Engel and what Dr. Ji-Hong did.

9 Because if you look at Dr. Engel's report in
10 particular -- and, Your Honor, his report is Exhibit 1 to the
11 Court's motion -- but Table 4.1 in his report. And I'll put it
12 on the screen.

13 Jay, if you could go to the next slide, please.

14 Table 4.1 and the next table, Your Honor, which is
15 the next slide, Table -- well, I don't have it labeled, but
16 it's page 20 of Dr. Engel's report. Dr. Engel has actually
17 reviewed records that are submitted to the Oklahoma Department
18 of Ag and the Arkansas Natural Resource Commission about litter
19 applications in the watershed.

20 Under the regulatory programs that exist in both
21 states, contract growers and cattlemen and others who want to
22 use poultry litter have to report that to the appropriate
23 regulatory body, and they report not only how much litter they
24 put down, but where.

25 And so Dr. Engel, understandably, wanted to have

1 access to that information, and he's prepared some summaries.
2 And, Your Honor, the takeaway here is this: We've got -- in
3 the two tables, we've got six years' worth of records from
4 ODAFF and four years' worth of records from the Arkansas
5 National Resource Commission. And if you went in any one of
6 those years and you added up the total amount of poultry litter
7 that is reported as applied in the watershed, it comes nowhere
8 close to 354,000. It's more on the order of half.

9 THE COURT: The thing that troubles me, Mr. George,
10 is that, first of all, I remember very clearly from the
11 preliminary injunction hearing -- and I know that that evidence
12 is not necessarily before me -- but one thing that sticks with
13 me is that just the economics of hauling this stuff off is
14 prohibited.

15 And as I recall from the preliminary injunction
16 hearing, it is not economically feasible to haul this more than
17 50 miles away because it's generally rather light. And I know
18 we've had disputes here between wet and dry.

19 MR. GEORGE: Correct, Your Honor.

20 THE COURT: Obviously, wet is heavier than dry. But
21 to the extent that it's dry, it's very light and it takes a lot
22 of trucks to haul this away. And at a certain point, it is
23 economically infeasible.

24 So why is it not -- because certainly we're not
25 holding the plaintiffs here to an exact number. They argue

1 hundreds of thousands of tons applied in the IRW. Surely
2 that's not a number that breaks the back of this analysis,
3 right?

4 MR. GEORGE: I think this is one of many problems.
5 The cumulative effect of them, I think, does break the back of
6 the model. But I don't want to overstate this, and I do want
7 to address Your Honor's comments because there has been
8 testimony in this case and there will be more testimony at
9 trial, I suspect, about the economics that Your Honor is
10 recalling.

11 And certainly economics plays a role in how far
12 poultry litter moves. And there's some constraints that vary
13 over time as to how far, depending upon commercial fertilizer
14 prices, fuel prices, etcetera, but I don't believe that it is
15 as black and white as, you know, poultry litter never moves
16 more than 50 miles. But I do acknowledge that there are some
17 economics in play.

18 But, Your Honor, the reality is that -- let's go to
19 the next slide, Jay. Dr. Engel had available -- he didn't have
20 to speculate about whether or not poultry litter is leaving the
21 watershed. If you look at --

22 THE COURT: I guess what I'm saying is that these
23 figures that come from the Arkansas and Oklahoma agricultural
24 regulators, I've been around government long enough to distrust
25 government figures. I doubt that there are folks out there

1 really accurately measuring how much is put down. Wouldn't you
2 agree?

3 MR. GEORGE: Well, Your Honor, I wouldn't want to say
4 that I distrust government figures.

5 THE COURT: We're in a postal office here, and I
6 guarantee you, having been around government for about, well,
7 all my life, it ain't very efficient. It's not very accurate.

8 MR. GEORGE: Your Honor, I think the point I'm trying
9 to make is when a modeler has a choice between an assumption
10 and records and data, the natural tendency of scientists should
11 be to use records and data over assumptions unless there's
12 reason to deviate. And I'm not aware of reasons to deviate in
13 this case

14 And, Your Honor, in addition to not taking into
15 account the records that he reviewed with ODAFF and ARNC as to
16 the amount of litter that hits the ground, Dr. Engel had some
17 confirmed reports in Table 4.2 of his report of poultry litter
18 being exported.

19 There was some attempt in this case and before this
20 case to document the export of poultry litter out of the
21 watershed, and there's some programs in place out there that
22 are designed to encourage the export.

23 So, Your Honor, there is some reliable information
24 because people are paid subsidies based upon the export,
25 there's some reliable information out there about the extent to

1 which documented poultry litter exports occur.

2 And Dr. Engel had that information. He set it out in
3 his report. In fact, he found, for example, in 2006, the most
4 recent year, that those records showed that there were 69,000
5 tons of poultry litter exported from the watershed under these
6 programs. Documented, confirmed, subsidies paid.

7 And, Your Honor, Dr. Engel and Dr. Ji-Hong didn't
8 take that into account in their modeling. They didn't give a
9 credit for that. They simply said, we're going to assume that
10 every pound that's generated in the watershed is applied in the
11 watershed.

12 Your Honor, the other thing in terms of modeling set
13 up and characterization of poultry litter that's problematic in
14 their model is that Dr. Engel and Dr. Ji-Hong assumed that
15 every pasture in the watershed, every single one that's
16 identified in their data coverset as pasture receives poultry
17 litter and receives it every year.

18 Your Honor, there's simply no factual basis for
19 that. Some pastures receive poultry litter and receive them on
20 a regular basis; some pastures don't receive poultry litter.
21 And so the assumption that was made there is not realistic of
22 what is actually occurring. And it has a profound impact on
23 the model.

24 In addition, Your Honor -- and this is perhaps one of
25 the most egregious mistakes made with respect to characterizing

1 poultry litter -- the timing of poultry litter application.
2 Your Honor is well aware from the claims that were made at the
3 preliminary injunction hearing that timing of poultry litter is
4 important. The motion that was made to Your Honor was
5 predicated on the belief that most poultry litter goes down in
6 the spring and heavy rains come, and that's when there's a
7 propensity for runoff. So the inverse of that is, poultry
8 litter supplied in the fall or in the summer may not be as
9 great a risk. You know, there's some natural flow in rainfall
10 patterns that are simulated in the model.

11 THE COURT: There's no question here that the
12 problems that we're dealing with here in terms of bacteria and
13 phosphorus are higher in high runoff periods, right?

14 MR. GEORGE: The concentration or the flow?

15 THE COURT: Good question.

16 MR. GEORGE: Yeah. And I don't think there's an
17 answer that applies to both of those. But there is no question
18 that you see differences in stream water quality, not just in
19 this watershed but any watershed, during heavy rainfall events.

20 THE COURT: The point you're getting is the
21 assumption that everything was applied on April 1st.

22 MR. GEORGE: That's exactly right, Your Honor, and
23 that's unrealistic on its face, but it's even more unrealistic
24 given the data that was available to Dr. Engel.

25 If you look at -- Jay, if you'll go to the next slide

1 -- if you look at table -- if you look at Figure 4 in
2 Dr. Engel's report, Your Honor, he's reviewed records to get a
3 sense as to the frequency and timing of poultry litter
4 applications in the watershed; not an irresponsible thing to
5 do. You ought to review that information.

6 Well, the information in the data tells him that
7 poultry litter is applied, you know, some percentage throughout
8 the year and in no -- any month is a hundred percent applied.
9 The highest month in his analysis is about 18 percent. The
10 month of April, which is the date that he used, is about 17
11 percent.

12 So even though the data told him that poultry litter
13 is applied in, you know, different periods throughout the year,
14 he assumed it was all applied on April 1st before the spring
15 rains came and was subjected to potential runoff in his
16 analysis.

17 And, Your Honor, that's simply not realistic. It's
18 not a reasonable reflection of what's happening in the
19 watershed.

20 And the analogy I would draw here, Your Honor, with
21 respect to how poultry litter has been characterized is Your
22 Honor has probably had an opportunity to have an accident
23 reconstructionist appear before you at some point in time.
24 I've had opportunity to cross-examine folks of that
25 discipline. And, you know, if there was an accident

1 reconstructionist who was coming forward with his computer
2 simulation of an accident, how an accident happened, it would
3 be important that the accident reconstruction get the weather
4 conditions right; if it was raining on the day of the event,
5 that his simulation involved rain; get the make and model of
6 the car right; was it a pickup truck or was it a Pinto; get the
7 shape and contours of the road correct.

8 What we have in the setup by Dr. Engel in his model
9 is an accident reconstruction, if you will, where the basic
10 events that they claim results in the accident have not been
11 described in a way that's consistent with what actually happens
12 in the Illinois River Watershed.

13 So, Your Honor, if you set up your model in a way
14 that's not realistic and representative of the environment, the
15 results that you're getting are not going to be realistic and
16 representative of the environment.

17 Go to the next slide, Jay. The GLEAMS model and its
18 model setup are not the only parts of Dr. Engel's methodology
19 that the Court needs to consider because, Your Honor, once you
20 have the model and you set it up and you input the data and you
21 run it, you get output.

22 And as Your Honor indicated earlier, Dr. Engel takes
23 the output from this GLEAMS model and he runs it into another
24 model that we're going to talk about in a moment called the
25 routing model. But I think it's important, Your Honor, to

1 understand what you get out of GLEAMS and what you don't.

2 Your Honor, the GLEAMS output predicts edge of field
3 phosphorus losses. That's the prediction that you get from the
4 GLEAMS model, and it does it by HRU and by land use category.
5 And so you get a number within each HRU as to the phosphorus
6 loss associated with pasture land use, urban land use, row crop
7 land use, and forest land use.

8 Your Honor, what you don't get from GLEAMS is a
9 number specific to poultry litter. GLEAMS is not a model that
10 you run and you say, here's how much poultry litter is applied
11 on the surface, and it spits out a number that says 59 percent
12 of the phosphorus load at Lake Tenkiller is caused by poultry
13 litter. GLEAMS is just not intended for that purpose, it's not
14 capable of doing that.

15 And, in fact -- in fact, Your Honor, the GLEAMS
16 world, the GLEAMS modeling world, ends at the edge of the
17 field, so it can't even tell us how much phosphorus gets to a
18 stream and then how much phosphorus makes it through the
19 attenuation process, the absorption process, the uptake process
20 of those stream channels to make it down to Lake Tenkiller.
21 That limitation in GLEAMS, that field of scale orientation, is
22 why Dr. Engel needed a routing model.

23 Does Your Honor have a question?

24 THE COURT: Well, two questions. First of all,
25 Engel's focus was phosphorus in Lake Tenkiller, and I

1 understand your criticisms there.

2 MR. GEORGE: Sure.

3 THE COURT: Some of these assumptions in terms of his
4 model setup actually work to balance things out, do they not?
5 For instance, 100 percent of pastures received poultry litter
6 every year, which would actually spread out the application and
7 increase absorption phosphorus as opposed to overloading a
8 single pasture, which we know from the earlier preliminary
9 injunction hearing does occur.

10 Urban areas simulated as alfalfa pastures. From
11 earlier testimony, we know alfalfa uptakes phosphorus. Urban
12 areas, obviously it flows off.

13 So even though you may have assumptions in the model
14 that may increase phosphorus runoff, you also have assumptions
15 which would decrease it, correct?

16 MR. GEORGE: Your Honor, certainly the type and
17 number of mistakes that were made have differing impacts. Some
18 of those, depending upon your perspective, defendant versus
19 plaintiff, some of those impacts may be positive for your
20 position or negative for your position.

21 But, Your Honor, what we don't know and what I'm
22 hesitant for either myself or this Court to gamble on is the
23 idea that those admitted mistakes in the way in which the
24 model's set up balance out in such a way as to end up with an
25 output that is reasonable and realistic in terms of what's

1 really happening.

2 THE COURT: In focusing on the methodology for a
3 moment, I'm trying to understand the importance of the Engel
4 testimony here. I take it the importance is the relative
5 impact of poultry application to the phosphorus load intake at
6 Lake Tenkiller and relative to other inputs: Sewage, you say
7 erosion.

8 Of course, we had erosion, accretion and aversion
9 when the Illinois River and Lake Tenkiller was perfectly clear,
10 right?

11 MR. GEORGE: Certainly, Your Honor.

12 THE COURT: You're from that area. You're well aware
13 of what things were like there, right?

14 MR. GEORGE: My vintage only goes back about 20
15 years, not as long as Your Honor's. But certainly the
16 defendants don't -- I mean in the watershed; not in terms of
17 age. Let me clarify that.

18 THE COURT: You're much younger than I am,
19 Mr. George. Besides, you didn't come east or cross -- west
20 across the border; you probably stayed there at Beaver Lake.

21 MR. GEORGE: Anytime your opponents are laughing,
22 that's not a good moment for you, Your Honor, so I retract that
23 statement.

24 But, Your Honor, on the point of erosion, this is, I
25 think, an important point here, there's no doubt that some

1 amount of erosion has been occurring in this watershed from the
2 very beginning.

3 THE COURT: Absolutely.

4 MR. GEORGE: But one thing that Your Honor will see
5 in testimony at trial is that erosion -- once you create a dam,
6 once you dam up a flowing body of water and you start forcing
7 pressure back upstream and you start having development in the
8 watershed in terms of the clearing of lands, the scale of
9 erosion today compared to the scale of erosion, say, in 1954
10 when the dam was built, are not comparable.

11 And so I don't think it would be wise for us to
12 discount erosion and say that its increase over time is not
13 having an impact. I don't think you'll even hear that from the
14 plaintiffs' experts.

15 So there has been some -- there are some sources that
16 are constant. Some have gotten larger. Some have gotten
17 smaller over time. Erosion is one the defendants believe very
18 much has had a disproportionate impact in recent decades
19 compared to, say, the 1950s.

20 Your Honor, the next step from GLEAMS, once you have
21 the output from GLEAMS, because GLEAMS world ends at the edge
22 of the field and it doesn't take you to a water body, Dr. Engel
23 and Dr. Ji-Hong -- and Your Honor is correct; the question they
24 want to answer is what percentage of the load's at Tenkiller,
25 not at the edge of a field. So Dr. Ji-Hong and Dr. Engel --

1 THE COURT: Well, Engel doesn't even touch edge of
2 field. And I know that's one of your criticisms --

3 MR. GEORGE: Correct.

4 THE COURT: -- but to the extent that he's trying to
5 calculate the effect on Lake Tenkiller -- and that's all
6 they're attempting to do with Engel, right?

7 MR. GEORGE: Right. But here's why GLEAMS and its
8 prediction of edge of field is important, because I think
9 that's what you're struggling with, and it's a legitimate
10 question, Your Honor.

11 If all Dr. Engel was doing was saying, I'm taking
12 GLEAMS and I'm running it through a routing model and the only
13 opinions I'm going to offer is changes in total phosphorus load
14 over time, that would be one thing.

15 THE COURT: Right. You're trying to say he can't
16 attribute it to poultry if he's not modeling edge of field.

17 MR. GEORGE: That's right. And these edge of field
18 predictions that haven't been validated, because they haven't
19 been compared to any data in this watershed, are what is
20 used -- Your Honor, if you drew a line from GLEAMS output all
21 the way over to allocation, the reality is that Dr. Engel's
22 methodology for allocating phosphorus loads takes the output
23 from GLEAMS that's unvalidated, been subjected to no testing,
24 and it uses it as a vehicle for allocating back the phosphorus
25 at Lake Tenkiller to poultry litter edge-of-field losses.

1 So that's why it's important, Your Honor, and that's
2 why all of these steps from the GLEAMS output until you get to
3 the allocation are important.

4 Now, Your Honor, with respect to the routing model.
5 It was necessary for Dr. Engel and Dr. Ji-Hong to develop a
6 routing model in this case for all of the GLEAMS limitations
7 that Your Honor and I have been discussing. They got to get
8 loads to Lake Tenkiller in order to complete their analysis,
9 and GLEAMS won't do that.

10 And Your Honor, there are all sorts of commercially
11 available and well-recognized instream routing models that are
12 used by water quality modelers every day in environmental
13 engineering disciplines that are available, but Dr. Engel and
14 Dr. Ji-Hong didn't employ an off-the-shelf model for instream
15 transport; instead, they developed their very own -- what they
16 call an empirical model for use in this case.

17 And, Your Honor, it really is a regression equation.
18 It's a regression equation that was developed by Dr. Engel and
19 Dr. Ji-Hong. And the goal of that equation, Your Honor, is to
20 take the edge-of-field data that GLEAMS spits out and the point
21 sources that GLEAMS can't model -- we've got loads for point
22 sources -- and to force some portion of those loads to match
23 the downstream USGS-reported phosphorus loads at the top of
24 Lake Tenkiller. And so it's really a forcing model,
25 Your Honor. It's designed to recognize that not everything

1 that -- it's designed to account for the fact that the
2 phosphorus loads at Lake Tenkiller are smaller than the
3 predictions of edge-of-field losses plus point sources.

4 And so if you assumed all of it got there, you'd have
5 a problem. You've got to screen some out. And that's what
6 this routing model does.

7 And the problem, Your Honor, is this: It's not
8 physically based. It's not a model -- and Dr. Engel admitted
9 this in his deposition. It's not a physically based model.
10 It's not designed to simulate what actually happens in terms of
11 the settling of phosphorus and sediment, the resuspension of
12 phosphorous during rain events, the uptake of phosphorus by
13 plants. It's not designed to actually simulate what happens.
14 It's designed to make their model predictions look like they
15 match the data at the north -- I'm sorry, at the top of Lake
16 Tenkiller.

17 Your Honor, this is a routing equation that's not
18 been peer reviewed, it's not been subjected to any testing
19 Dr. Engel could not identify any instance in which any other
20 modeler had used it in a study that he had noted. It's
21 something that he and his postdoc student came up with in this
22 case.

23 And, Your Honor, the way in which this is set up,
24 this routing equation, precludes both Dr. Engel and the Court
25 and Dr. Bierman from being able to test the linked models, the

1 linked system of GLEAMS and the routing model.

2 There is discussion, Your Honor, in Dr. Engel's
3 report -- and there will be more discussion of it, I suspect,
4 when plaintiffs respond -- about Dr. Engel calibrating and
5 validating his linked models. And that's the next step of the
6 process, Your Honor.

7 And what he did there is in terms of calibration --
8 calibration is where you adjust the parameters of the model,
9 input values, default values. And you just adjust them
10 randomly to try to get the best fit. So Dr. Engel and
11 Dr. Ji-Hong were adjusting these parameters in the model to try
12 to make the output on the back side of the routing model -- not
13 on the back side of GLEAMS -- match their USGS downstream
14 stations.

15 And calibration is something that's done. It's done
16 with most models. There's nothing terribly offensive about the
17 fact that it was done here. But, Your Honor, calibration does
18 not insulate this model from criticism because the next step,
19 Your Honor, after calibration is validation.

20 And Dr. Engel claims that he's validated this model.
21 And really all that means, Your Honor, is he's taken another
22 set of data and he's running it through the model after it's
23 been calibrated and he's tried -- and he's compared the output
24 from the routing model to USGS data at those -- the same three
25 downstream stations to see whether or not there's a match and a

1 fit. And he reports in his report very good fits for the
2 downstream stations in terms of the observed loads and his
3 predictions on the back side of his routing model.

4 But here's the problem, Your Honor. The way in which
5 the routing equation was set up, he's sort of fixed that
6 result. It's guaranteed to fit. It's guaranteed to fit
7 because the routing model is a regression equation that is
8 designed to match USGS loads.

9 And so the data coming out of the routing model is --
10 by definition, it's been arbitrarily adjusted by the equation
11 to fit the USGS loads. And so when Dr. Engel --

12 THE COURT: But how arbitrary is it if it fits the
13 USGS loads? I mean, obviously he's checking by virtue of the
14 USGS loads, and it has to calibrate to figure what's coming
15 down.

16 Once again, of course, we don't know the source of
17 the phosphorus coming down, but he's matching it to the USGS,
18 which is what he should do, right?

19 MR. GEORGE: He certainly should compare his model
20 results to data as to what the model is predicting.

21 THE COURT: It has to match the data, right?

22 MR. GEORGE: If it doesn't match the data, there's a
23 problem, yeah. But to Your Honor's question, which is a good
24 one, as to how arbitrary can it be if it matches, the fact that
25 it matches does not suggest that the routing model is actually

1 simulating in a reasonable way what happens.

2 For example, Your Honor, if I knew I wanted to get --
3 I wanted to get zero, my observed loads at the three USGS
4 stations were zero and I had to match it, I could have a
5 routing equation that says whatever I get from GLEAMS, I'm
6 going to multiply times zero and I'm always going to get an
7 observed load. So it's mathematics. It's not engineering in
8 the sense that this is simulating what actually happens. It's
9 just forcing the data to meet.

10 Your Honor, the problem that the defendants have is
11 not so much with the fact that it matches up, but it's the idea
12 that Dr. Engel is saying because I've developed an equation
13 that makes it match, that means that all of the preceding part
14 of the chain all the way back up to GLEAMS is reasonable. And
15 then I can use GLEAMS to come over here and allocate back
16 loads.

17 Well, the reason -- it matches because of
18 mathematics, not because his model is reliable. That's the
19 point, Your Honor.

20 Now there are some very well recognized -- Jay could
21 you go to slide 14, please. Fortunately for both you and I, we
22 as lawyers don't have to guess as to what are the steps that
23 you should take to actually test whether or not your model is
24 doing a good job predicting what it's supposed to be
25 predicting. EPA has given guidance on this exact subject.

1 THE COURT: Sensitivity analysis, calibration
2 validation.

3 MR. GEORGE: Sensitivity analysis, corroboration, and
4 an uncertainty analysis. I know there is some debate,
5 Your Honor -- and obviously Your Honor has read at least some
6 portion of Exhibit 11 to the motion, which is the EPA guidance
7 document on modeling. There is some disagreement, or I think
8 sort of artificial controversy as to whether this document has
9 bearing in this case. And there's an argument based upon a
10 disclaimer that appears at the beginning of this government
11 document, which I would suspect is not all that uncommon to see
12 disclaimers at the beginning of government documents, about
13 whether or not this document is legally binding and creates
14 legal obligations, and it's obviously words written by a
15 lawyer.

16 But, Your Honor, the plaintiffs try to get out from
17 under very clear guidance by EPA as to what you ought to do to
18 corroborate or test the reliability of a model by pointing back
19 to this disclaimer and suggesting that this means that
20 Dr. Engel's work should not be measured by the standards set
21 forth by EPA.

22 And so, Your Honor, I put on the screen -- and this
23 is Exhibit 11 to the motion. I put on the screen some excerpts
24 from this EPA guidance document just so the Court has a full
25 appreciation of the purpose of this document.

1 And if you look on page 9, which is the first
2 excerpt, Your Honor, EPA makes very clear that the evaluation
3 processes for models are designed to establish protocols or
4 standards that help ensure the utility, scientific soundness,
5 and defensibility of the models and their outputs for decision
6 making. And, Your Honor, those phrases, "utility, scientific
7 soundness, and defensibility of models and decision making,"
8 obviously match up fairly well with this Court's obligation
9 under Daubert to review some of those same features of
10 scientific testimony.

11 The EPA says in that same paragraph that this
12 guidance document is -- I'm sorry, this guidance document and
13 the principles and practices described in the document apply
14 generally to all models used to inform Agency decisions
15 regardless of domain, mode, conceptual basis, form, rigor...
16 etcetera. And the principles presented in this document are
17 applicable not just to models for regulatory purposes but
18 models used for other purposes as well.

19 So what's the guidance? What does EPA say is
20 required in order to test the soundness and reliability of a
21 model for decision making?

22 Your Honor hit all three of them just a moment ago:
23 Model corroboration, confronting a model with data to see
24 whether or not the predictions compare to the actual data. We
25 know Dr. Engel did not do that with respect to the edge-of-

1 field losses by GLEAMS, even though he had the ability to do
2 so.

3 Secondly, sensitivity analysis. Your Honor, this is
4 important because the question Your Honor mentioned earlier of,
5 you know, the impact of some of these decisions that were made
6 in model setup; the way you test that impact is to do a
7 sensitivity analysis. How sensitive is this model to the
8 difference between 300,000 tons of poultry litter and 100,000
9 tons of poultry litter? Well, you run a sensitivity analysis.

10 How sensitive is this model to soil test phosphorus
11 levels and the assumptions that you've made about those in the
12 watershed? Well, you run a sensitivity analysis to test those
13 things.

14 Dr. Engel admits in his deposition that he conducted
15 no sensitivity analysis on this project.

16 And then lastly, Your Honor, uncertainty analysis.
17 And if you look over on page 78, which is the bottom left-hand
18 block of this document, Your Honor, there's a description of
19 uncertainty analysis, which is pretty important, I think.

20 It says that uncertainty analysis investigates the
21 effects of the lack of knowledge or potential errors of model
22 inputs, and that when you combine sensitivity analysis and
23 uncertainty analysis, it allows the model user to be more
24 informed about the confidence that can be placed in model
25 results.

1 And, Your Honor, that's what this whole discussion
2 we're having today is about, is how much confidence can the
3 Court place in Dr. Engel's model results.

4 And given that he performed no uncertainty analysis
5 and no sensitivity analysis, Your Honor, I think we can place
6 very little confidence.

7 Your Honor, the defendants' concerns about Dr. Engel
8 not testing his model, not performing the right measures, don't
9 rest exclusively on this EPA document. And the defendants
10 actually went a few steps further to confirm that some of the
11 things that we were complaining about actually mattered in
12 terms of the results or that there are reasons for concern.

13 And what I'm talking about, Your Honor, is that
14 Dr. Engel performed a series of tests. And these tests were
15 focused to a large extent on the routing model, but he ran both
16 the GLEAMS model and the routing model linked. And the tests
17 were designed to see does his model respond in terms of
18 predictions to changes in the environment or changes in the
19 data where any scientist would expect a response if that
20 happened in the real world.

21 So, for example, if we increase the amount of poultry
22 litter by, you know, a factor of -- I think it was 17 by
23 Dr. Bierman -- and this model is reasonably predicting losses
24 associated with poultry litter, we would expect to see the
25 model to predict an increase in phosphorus loads at Lake

1 Tenkiller.

2 Well, when you do that with Dr. Engel's model, you
3 get no change. You still match the loads at the USGS station,
4 and it's because this model forces everything to fit down at
5 the very bottom.

6 The same is true, Your Honor, with point sources.
7 Raised point sources by a factor of 345, you get the same
8 predictions downstream at the three USGS stations.

9 There was some truly random tests that were run.
10 Dr. Bierman ran the model backwards so that it's raining on
11 days when it's dry and it's dry on days when it's raining.
12 Rain obviously drives these models. Well, you get the same
13 results at Lake Tenkiller.

14 Dr. Engel also did something completely random in the
15 sense that he substituted the phosphorus predictions from
16 GLEAMS with the S&P 500 Index and ran the model. Lo and
17 behold, you get the same result downstream and at Lake
18 Tenkiller.

19 These are interesting, but, Your Honor, they're also
20 important because they illustrate that the model was set up due
21 to oversight or design -- I don't know -- was set up to give
22 the same answer no matter what you changed in the model. And
23 that's the exact opposite of what a model is intended to do.

24 Your Honor, if we could go to the allocation
25 discussion for a moment, Your Honor. We've covered the steps

1 and the methodology, and I want to focus for just a moment on
2 the last step, which is allocation.

3 And this is the portion, Your Honor, I embarrassingly
4 pointed the Court to about 50 pages of deposition testimony and
5 asked the Court to read it when it had time. This is the part
6 that underlies the 45 percent and the 59 percent figures by
7 Dr. Engel, and it's the portion where I struggled with
8 Dr. Engel for hours on end asking for an explanation as to
9 exactly how he came up with these figures.

10 A couple of things we need to establish first,
11 Your Honor. The allocation in these figures of 45 percent and
12 59 percent are not the output of a model, okay. Neither the
13 routing model nor the GLEAMS model spit out percentages, 45
14 percent and 59 percent, for poultry litter or anything else.

15 The allocation is a step of calculations performed by
16 Dr. Ji-Hong principally -- Dr. Engel claims to have been
17 involved in it -- outside of the model. And what we know,
18 Your Honor, is that Dr. Ji-Hong took the results of edge-of-
19 field predictions from the GLEAMS model and used those in his
20 allocation calculations. And it appears that he took some
21 results from the routing model, but Dr. Engel could not confirm
22 that in his deposition.

23 We don't know which scenarios -- there are multiple
24 scenarios, all kind of different runs that were performed of
25 this model. We don't know which scenario was used to arrive at

1 these calculations.

2 Dr. Engel admits that in the rush to meet the Court's
3 deadline of May the 22nd, that he didn't describe his methods
4 on this allocation in his report. So we don't have any
5 guidance in the report as to exactly how it was done.

6 But we do know, Your Honor, that at its most basic,
7 Dr. Engel and Dr. Ji-Hong came up with some calculation to take
8 the pasture load -- GLEAMS does give -- one of the land uses is
9 pasture, so GLEAMS gives a total predicted phosphorus loss for
10 pasture.

11 And as Your Honor is well aware, there are a lot of
12 different sources that could impact phosphorus loss in pasture;
13 could be phosphorus from the soil, could be phosphorous from
14 poultry litter, could be phosphorous from cattle manure, could
15 be commercial fertilizer, a lot of different things that might
16 be rolled up into that number of pasture.

17 And Dr. Engel and Dr. Ji-Hong came up with some
18 method to break that apart to say the prediction from GLEAMS as
19 to pasture, so much of it is poultry litter and so much of it
20 is commercial fertilizer and so much of it is cattle manure.
21 We don't know all the steps involved in that. And I think this
22 Court should have some concern about allowing that testimony
23 into the record without knowing all of those steps.

24 But we do know a little bit about one of the steps,
25 and that is cattle. And I'm very sensitive to -- Your Honor, I

1 know there's been a lot of discussion of cattle and there will
2 be more discussion of cattle in this case, and I don't want to
3 beat a dead horse or a dead cow, but cattle are important in
4 this watershed and --

5 THE COURT: I think the testimony that we heard a lot
6 about was of cow pies.

7 MR. GEORGE: Yes, Your Honor, yes. Not the most
8 pleasant of discussions; I do squarely appreciate that. But,
9 Your Honor, obviously one of the disputed scientific principles
10 or issues in this case is how much do cattle contribute versus
11 how much do poultry contribute. That's something we're going
12 to wrestle with. And Dr. Engel and Dr. Ji-Hong claim that
13 they've figured it out, that they've broken it down somehow;
14 and Dr. Engel wants to offer the opinion that six percent of
15 the phosphorus load in this watershed comes from cattle. Six
16 percent of what reaches Lake Tenkiller comes from cattle. And
17 that number is based on this allocation method.

18 Well, we know a few basic facts about cattle,
19 Your Honor, that are important to how Dr. Engel got to this
20 number. We know that Dr. Engel, in his own report, has
21 quantified the amount of cattle manure that actually hits the
22 ground in the Illinois River Watershed, and that number is 7.8
23 million pounds of phosphorus; phosphorus in cattle manure that
24 hits the ground. And that's in Appendix E-1 to Dr. Engel's
25 report, which is Exhibit 1 to the motion.

1 So you start with 7.8 million pounds of phosphorus.
2 And then Dr. Engel assumes in his allocation that phosphorus
3 will not get in the water unless it is deposited -- phosphorus
4 from cattle -- unless it's deposited within ten meters of a
5 large stream, and he defines a large stream as a third order or
6 higher. And if Your Honor is familiar with order of streams, I
7 won't tell that whole long story. But you classify streams
8 based upon how many tributaries they join. So third order or
9 higher. It's the larger streams. It would not be the
10 intermittent streams that run through fields and pastures. It
11 would be, you know, probably the types of streams that are
12 large enough to have a name would be the typical cutoff.

13 So Dr. Engel says in his analysis, I'm going to
14 assume that the only phosphorous out of this 7.8 million pounds
15 from cattle that gets to a stream is the phosphorus in cow
16 manure that is deposited within ten meters of a third order or
17 stream higher. That's step 1.

18 And then he uses something called a capture zone
19 analysis where, you know, he claims to have determined that
20 there are 35,000 pounds of phosphorus from cattle that are
21 deposited on these pastures within ten meters of a third order
22 or larger stream. So you see, Your Honor, we're taking big
23 slices; we're going from 7.9 million pounds of phosphorus down
24 to 35,000 pounds of phosphorus.

25 But then Dr. Engel takes another slice. This is

1 pretty telling, Your Honor, I believe, of the lack of
2 scientific rigor, honestly, in supporting some of his
3 assumptions. Dr. Engel takes this 35,000 pounds of phosphorous
4 and he cuts it almost in half, reduces it by 45 percent. And
5 he makes that reduction based upon the assumption that there
6 are some cattle on these pastures that are fenced out of
7 streams; therefore, they can't get within ten meters of a
8 stream. The riparian areas are protected. And so he reduces
9 it by 45 percent.

10 Where does the 45 percent number come from? This is
11 the interesting part of the story, in my view, Your Honor.
12 Comes from Ed Fite. Ed Fite is the chairman of the Oklahoma
13 Scenic Rivers Commission. Apparently Dr. Engel called Mr. Fite
14 one afternoon and asked him, you know, based on his experience
15 in the watershed, does he have a view as to whether cattle are
16 regularly fenced out of streams. And Dr. Engel claims that
17 Mr. Fite told him, you know, 40 to 50 percent of cattle are
18 fenced out, and he used that number.

19 Well, Your Honor, we deposed Mr. Fite in this case,
20 not just for this reason, but for other reasons; and the
21 excerpts or the relevant excerpts of his deposition are
22 attached as Exhibit 10 to the Court's motion. And we asked
23 Mr. Fite in this deposition about this conversation.

24 And his description of what it is and the basis for
25 it is so far removed from scientific analysis -- we're not

1 being critical of Mr. Fite, but it's important for the Court to
2 understand he didn't do any serious analysis, there's no
3 statistical analysis associated with how many fields have
4 fences and how many don't. He described his 40 to 50 percent
5 number as just sort of a windshield assessment, hit or miss,
6 driving around, general observation.

7 And importantly, Mr. Fite said he would not be
8 comfortable offering that opinion in court as, you know, a
9 scientific opinion as to the percentage of cattle. But
10 nevertheless, Dr. Engel used it in his allocation method to
11 reduce the portion of cattle.

12 So, Your Honor, the net result of all of these steps
13 by Dr. Engel -- and that's just one part of his allocation
14 methodology that we know something about -- is he takes 7.9
15 million pounds of phosphorus from cattle and he gets down to
16 about 18- or 19,000 pounds of phosphorus, and that's how he
17 gets to his number of six percent of the load comes from
18 cattle.

19 Now, Your Honor, all of that is good for cattle, I
20 guess, in terms of having a low number in this case from
21 Dr. Engel, but it's bad for poultry and it's bad science.

22 The default bucket under the pasture in Dr. Engel's
23 allocation methodology is poultry. So, Your Honor, whatever
24 molecules of phosphorus in his and Dr. Ji-Hong's calculation
25 that they can't put into either a cattle bucket or a commercial

1 fertilizer bucket or a soil test phosphorus bucket, it ends up
2 in the poultry bucket.

3 And so the diminishment of these other sources in a
4 very arbitrary fashion serves to inflate the poultry portion,
5 and that's how you get to a number like 59 percent of the
6 phosphorus at Lake Tenkiller comes from poultry. It's as a
7 result of those allocations that are poorly described, not
8 based on any scientific literature that's been identified,
9 developed for this case and applied by Dr. Engel for the very
10 first time. It's not a result of legitimate science.

11 Dr. Engel admits that his allocation method has not
12 been peer reviewed. He can't point to a peer-reviewed journal
13 applying a method that is like his method. He says other
14 people allocate phosphorus loads. I don't have any doubt that
15 that's the case. There are scientists out there who have
16 attempted to allocate phosphorus loads to sources. That's not
17 the question; nor is it the test. The test is, is his method
18 generally accepted; and we have no basis to believe that it is.

19 So, Your Honor, in conclusion -- and I appreciate
20 your indulgence because I know I've taken some time -- the
21 question before the Court is whether the methodology, what's on
22 the screen, satisfies the test for admission of scientific
23 testimony under Rule 702 and Daubert. That's the test. And as
24 Your Honor is well aware, there's sort of two prongs to the
25 analysis. One is reliability and the other is fit or

1 relevancy. And for reliability, the test is well known to
2 Your Honor. The methods -- one factor is are the methods
3 subjected to testing or susceptible to testing. Not in this
4 case.

5 Some of his predictions are about things that are
6 going to happen a hundred years from now. They're not
7 susceptible to testing. He didn't attempt through uncertainty
8 analysis or sensitivity analysis to test his own work in this
9 case. To the extent it has been tested by Dr. Engel, it's
10 failed.

11 And so, Your Honor, we believe that it fails on the
12 first prong.

13 The second factor, Your Honor, is are the opinions
14 subjected to peer review and publication? They're not.
15 There's no peer review or publication of Dr. Engel's work in
16 this case, and so the Court can place no confidence from an
17 external source on his work.

18 The third factor is does the method have standards
19 controlling its use and a known rate of error. Well, there are
20 EPA standards. We've talked about those in the guidance
21 document. Dr. Engel didn't follow them, and so he fails on
22 that prong.

23 In terms of a rate of error, Dr. Engel didn't perform
24 an uncertainty analysis, so we don't know. We don't know how
25 far off from reality his predictions are.

1 Your Honor, one of the things that's troubling
2 anytime you question a modeler -- and I've either had the
3 blessing or the curse of having questioned a few modelers --
4 one thing that's troubling, Your Honor, is you ask them what's
5 really going to happen. Can you, Dr. Engel, tell me what's
6 really going to happen in this watershed, in this lake? And
7 you never get a definitive "yes." What you get is: Well, the
8 model suggests. Well, the model suggests.

9 Well, Your Honor, we can't swear in a model to
10 testify. It's not the way our court system works. We have to
11 deal with experts who offer concrete opinions that have
12 scientific validity and reliability. And Dr. Engel --
13 Dr. Engel's methods are uncertain and his results are
14 uncertain, and we have no way of understanding how far off or
15 close they are because we don't have an error rate.

16 And then the last part of the reliability prong,
17 Your Honor, is whether the methods are generally accepted in
18 the scientific community. And this goes back to the discussion
19 over what is the method.

20 GLEAMS has been used by other modelers. No dispute
21 there, Your Honor. Not been used in this setting at this
22 scale, but GLEAMS, which is a part of the methodology, in
23 certain settings has gained some acceptance in the scientific
24 community. The rest of his methodology has not, and the way in
25 which he employed GLEAMS in this case has not. So, Your Honor,

1 his methods are not generally accepted.

2 Then lastly, Your Honor, the second prong of the
3 analysis is that the expert work must have a valid scientific
4 connection to the disputed facts of the case, and this goes
5 back to the accident reconstruction analogy I gave you.

6 The way in which he set up his model, Your Honor, it
7 simply does not marry up with the facts of this case. And so
8 the results that he gets out of that model don't fit. They
9 don't fit the actual issues that this Court must consider,
10 which is what have these defendants actually caused in the
11 watershed.

12 So, Your Honor, that's all I had in terms of prepared
13 remarks. I certainly will take -- would be happy to try to
14 answer any questions you have.

15 THE COURT: I think you're fine. Thank you.

16 MR. GEORGE: Thank you, Your Honor.

17 THE COURT: Any response?

18 MR. PAGE: Yes, Your Honor. Your Honor, would you
19 like to entertain a short break before we begin?

20 THE COURT: I don't need to. Anyone care to?

21 MR. PAGE: I'm fine, Your Honor. I was just asking
22 what the Court would prefer.

23 THE COURT: Yes, sir. Go ahead.

24 MR. PAGE: My name is David Page. I'm representing
25 the State of Oklahoma.

1 Your Honor, I would be remiss if I didn't at this
2 time, before I begin my remarks, make an offer of proof
3 concerning the declaration that was stricken by the Court by --

4 THE COURT: Which one?

5 MR. PAGE: Dr. Engel's declaration that was filed in
6 response to the Daubert motion. Your Honor, for the record,
7 it's docket 2158, it's Exhibit C. That declaration was
8 prepared by Dr. Engel to respond to the many interesting
9 arguments offered by the plaintiff -- excuse me, by the
10 defendant against Dr. Engel's reliability of his model.

11 So in that respect, the declaration was not offered
12 for testimony. It goes solely to the Daubert hearing and
13 responding to the issues that have been raised by Dr. Bierman,
14 who is an attack expert, that's his purpose. He doesn't offer
15 any alternative model or allocation of sources of phosphorus in
16 the watershed.

17 And, Your Honor, I think it's a matter of fairness
18 that Dr. Engel or any expert who submits a expert report in May
19 and then there's an attack 11 months later by the Daubert
20 motion or eight months later by an attack expert like
21 Dr. Bierman, it's only a matter of fairness that you either
22 allow Dr. Engel to testify and answer any questions, which we
23 requested, or at least consider his declaration. So I make
24 that offer today.

25 THE COURT: So you're not suggesting that you would

1 use it at trial at all?

2 MR. PAGE: No, Your Honor, only -- the issues go to
3 the reliability in the Daubert hearing. And so Dr. Engel was
4 assisting counsel with the declaration, explaining that the
5 points made by Dr. Bierman, which is a rebuttal expert, attack
6 expert, and by counsel, a lot of these -- most of these
7 arguments, I'm going to point out to you, Your Honor, are
8 simple lawyer arguments. They're not supported by any
9 scientific publication or scientific testimony.

10 Our --

11 THE COURT: Most of which arguments?

12 MR. PAGE: I'm going to point out to you, Your Honor,
13 the arguments made by counsel today for the Daubert hearing are
14 unsupported by the scientific literature or any opinion offered
15 by any expert by the defendants.

16 So I think Dr. Engel's declaration is appropriate.
17 And I have prepared in my remarks, Your Honor, to point to the
18 Court exactly which paragraphs in his declaration, which is
19 Exhibit C to docket 2158 -- I'll respond to the specific issues
20 that are raised by the defendants in their challenge.

21 THE COURT: You may do so.

22 MR. PAGE: Thank you, Your Honor.

23 THE COURT: Mr. Page, let me ask you a question here,
24 since we've -- we're going back and plowing ground here. And I
25 understand your position. But to the extent that you're

1 relying on new matters contained in the new Engel declaration,
2 let's assume for the moment that I permit this for the purposes
3 of Daubert, but Engel's opinion, unsupported by the new
4 material, goes on to be considered at summary judgment or at
5 trial. Doesn't Engel's -- or, conceivably, couldn't Engel's
6 opinion collapse, unsupported by the new material that you wish
7 to present to the Court now at a Daubert hearing?

8 You're saying, Judge, I agree, it's new, it's not
9 going to come on on summary judgment or trial. Don't I have to
10 confine myself to that which has already been discussed now for
11 years, without allowing Dr. Engel to bring new material which
12 was just filed last month?

13 MR. PAGE: Can I explain "new"? I think that's
14 what's important here. For example, let me give -- excuse me,
15 Your Honor.

16 THE COURT: We're going back. We're going back. You
17 know, as Judge Brett used to say, we're reploting ground. And
18 I don't know that this is serving any of us, but go ahead.

19 MR. PAGE: Let me just -- if I may, Your Honor, when
20 Dr. -- excuse me, when Mr. George says that GLEAMS has never
21 been applied to a watershed the size of the IRW, Dr. Engel --
22 that's a ridiculous statement that wouldn't ever be anticipated
23 by Dr. Engel to put in his original report. So in his
24 declaration, Exhibit C, he cites all the published literature
25 where GLEAMS has been applied to a watershed the same size or

1 larger than the Illinois River Watershed.

2 So that's what he's done. He's taken arguments that
3 claim he's had wrong methodology, and pointed out that the
4 methodology is well established in the published scientific
5 literature. And that's what the purpose of his declaration is.

6 THE COURT: If that was all he said, it wouldn't be a
7 33-page declaration, right?

8 MR. PAGE: Well, there's a lot of statements made by
9 the defendants, Your Honor. He explains why their attacks in
10 the Daubert motion don't make sense based on the literature and
11 the scientific methods.

12 THE COURT: Mr. George.

13 MR. GEORGE: Your Honor, I apologize, I don't mean to
14 interrupt, but I do need to be heard.

15 It appears as though we're moving into a motion to
16 reconsider the Court's ruling on Friday. That's what I sense
17 is the direction in which this is headed. Your Honor has
18 considered those declarations, has issued its ruling. If we
19 start down this path, I predict we'll have this same argument
20 with respect to all the other declarations. What this will
21 turn into, Your Honor, regrettably, will be a waste of the
22 Court and the parties' time arguing over the contents of a
23 declaration that's been stricken.

24 And Your Honor's observation is correct, that when we
25 get to summary judgment -- the summary judgment phase in this

1 case, these declarations are not -- we're going to have a
2 clouded record as to whether the Court has considered something
3 for purposes of Daubert that it hasn't considered for purposes
4 of summary judgment. I'm concerned we won't be able to tease
5 all that back out.

6 We prepared today based upon the Court's ruling on
7 Friday without the intent to walk through every jot and tittle
8 of this 33-page declaration. If the Court wants to do that,
9 then certainly the defendants will comply, but I feel as though
10 we're jeopardizing our ability to get anything done today.

11 MR. PAGE: Your Honor, I would like to just offer for
12 the Court the paragraphs, and they will be -- they will go to
13 these issues where they claim there is no scientific evidence.
14 And Dr. Engel provided the scientific evidence.

15 THE COURT: Well, it's here in the record with
16 respect to the Daubert motion. It seems to me, of course, the
17 issue that you touched upon, although defendants did say, I
18 believe, that it's never been used for this big a watershed,
19 the issue really is, is it fit to be. EPA apparently says it's
20 not.

21 MR. PAGE: Well, Your Honor, I'll address that in my
22 argument.

23 THE COURT: Here's the -- we just can't have these
24 constantly moving targets. I mean, to hit this September trial
25 date, we just can't -- we can't have new materials, continually

1 changed expert opinions up to a couple of months before trial.
2 Can't do it. And we talked about this in November of 2007,
3 tried to get a schedule so we could hit a trial date in
4 September.

5 And without allowing all this material in, in your
6 33-page declaration of Bernard Engel filed on June 5th of this
7 year, if there are any special matters such as this statement
8 that it's been used to model other large watersheds, go ahead
9 and make that as an offer of proof. I don't want a just
10 blanket 33-page -- you know, I hereby adopt the 33-page
11 declaration as an offer of proof and I submit it to the Court.
12 Let's try to get something accomplished here. So with that in
13 mind, Mr. Page, let's proceed.

14 MR. PAGE: I will do so, Your Honor. Thank you.
15 Your Honor, we have a short PowerPoint presentation just to --
16 two pages just to focus on the key points I would like to make
17 this morning.

18 First of all, the defendants' challenge. What is the
19 defendants' challenge? And I think Mr. George did properly
20 characterize this. Dr. Engel is testifying on more matters
21 than just section 10, which is --

22 THE COURT: There's no question. They're not
23 challenging anything other than section 10.

24 MR. PAGE: Exactly.

25 THE COURT: Okay.

1 MR. PAGE: And how that is important is this: The
2 other sections of his report, which go unchallenged, tend --
3 actually do validate the reliability of section 10. In other
4 sections of his report -- and we'll point this out as we go
5 through today -- there are discussions as historical
6 evaluations by other researchers, such as USGS and many
7 university personnel as well as EPA, as to the source of
8 phosphorus in the IRW, how those processes work. And those
9 previous publications support the results of section 10.

10 Also there's a discussion in Dr. Engel's report
11 concerning what's runoff coefficients. There's been a study by
12 researchers that if you put on so many pounds of poultry
13 phosphorus on land, in that year a certain percentage will run
14 off. And Dr. Sharpley, who's a well known expert in this area,
15 has estimated the coefficient as five percent. Dr. Nelson, who
16 used to be at the University of Arkansas, had a similar
17 percent.

18 The important part of that, Your Honor, is that
19 Dr. Engel's model shows that in the current year, based on
20 poultry application of 350,000 tons, three percent is runoff.
21 So it's actually even a little more conservative to the
22 defendants' benefit than these other coefficients.

23 Let me give you two more examples, Your Honor, that I
24 think is important. Dr. Engel's expert report has been
25 attached to our response with colored copies so you can see the

1 whole thing.

2 THE COURT: This is the original expert report?

3 MR. PAGE: Yes, sir. The original expert report has
4 been attached, along with his CV.

5 There's two other examples. One is the mass balance
6 that has not been challenged by the defendants in a Daubert
7 reliability context. The mass balance was used by Dr. Engel,
8 one, to determine which sources to allocate; but it also points
9 out that for phosphorus that's coming into the watershed, 76
10 percent of the phosphorus coming into the watershed is from
11 poultry. Only 6.9 percent is in the form of cattle feed.

12 Now, one of the things we're going to discuss this
13 morning is the cattle allocation. All the researchers who have
14 published and done evaluation of the Illinois River Watershed
15 have concluded the same thing, because of this mass balance
16 analysis; that is, that phosphorus that's in cattle manure is
17 simply recycled phosphorus that's brought into the watershed by
18 poultry feed and then the poultry litter being applied to the
19 land.

20 So those concepts are very important because
21 Dr. Engel, in Appendix D of his original report, explains how
22 he uses these other parts of his report to validate and to
23 confirm the results he found in his computer model.

24 So, Your Honor, I think that's just very important.
25 I just want to make that point. It's not just section 10 is

1 different; but section 10 is very important.

2 THE COURT: That's, in part, how he comes up with the
3 ultimate determination or as to percentage attributable to
4 cattle, or is he saying all of that which is attributable to
5 cattle is derivative of poultry?

6 MR. PAGE: What he determined is that given that
7 these researchers and his own mass balance analysis shows that
8 6.9 percent is coming from outside the watershed, he determined
9 that the cattle waste -- that is in cow patties being applied
10 to the fields -- if that's mostly phosphorus being recycled
11 from poultry, what is the mechanism that's related to cattle.
12 How do I fairly allocate a component to phosphorus in the
13 waters that get into the river, into the lake, as the Court has
14 pointed out, that his objective was with section 10 of his
15 report. How do I fairly allocate that component of cattle.

16 And he determined through an analysis that's part of
17 his expert reports in Exhibits E -- or Appendixes E and F of
18 his original expert report attached as Exhibit B to 2157
19 docket, he calculates a transport mechanism. What he does is
20 he allows cattle to get a transport mechanism. So it doesn't
21 add phosphorus, but it transports it into this water by moving
22 the phosphorus from a field of grass to a close area if those
23 cattle are in and around streams. That 6 percent that he
24 attributes to cattle is rather high when you consider that the
25 total phosphorus mass balance of actual cattle feeds that bring

1 in new phosphorus into the watershed is only 6.9 percent.

2 It's 5.2 percent for dairy cattle and it's 1.7
3 percent for beef cattle where they bring in supplemental
4 feeding like for in the wintertime when they have actual
5 phosphorus product.

6 Why this is important, Your Honor, is it shows
7 there's a validity, there's a harmony, there's a validation of
8 the computer model from these other methods that he used in his
9 report.

10 Now, Your Honor, the second point I want to make to
11 begin with is what is -- or who is Dr. Bierman. We're going to
12 talk about Dr. Bierman in a minute, but I think it's important
13 that to the extent that counsel for the defendants didn't make
14 up the argument themselves, they rely on Dr. Bierman. It's
15 about 50/50, in my understanding.

16 Some of the arguments that you've heard today are
17 unsupported by anything other than the lawyers' analysis, their
18 own view of how the science should work.

19 But who's Dr. Bierman? Dr. Bierman -- his deposition
20 and key parts of his testimony of his deposition, which I took,
21 are attached as part of docket 2158, Exhibit D. All the things
22 I'm going to state now about Dr. Bierman are verified in that
23 deposition, which is Exhibit D to docket 2158.

24 First of all, Dr. Bierman has no -- let me say that
25 again -- no experience on runoff modeling. He has never in his

1 life personally done any work on how to model either nutrients
2 or pesticides or anything else runs off of fields. And in a
3 watershed model, that's a big part of the component. He's
4 never done it.

5 He admitted that he's been involved with other teams
6 that involved major watersheds, but his aspect was more the
7 in-lake or in-river or the -- after the constituents have
8 gotten into the water. He's never personally done anything on
9 a runoff model.

10 Second of all, he's never worked with GLEAMS. And
11 there, I think, Your Honor, you're going to see the source of
12 the mistakes made by defendants here in their challenge to
13 Dr. Engel. He's never worked with GLEAMS. The first time he
14 worked with GLEAMS model was in this case.

15 Very important, Your Honor, he has no opinion nor did
16 he evaluate any sources of phosphorus. The defendants' modeler
17 is offering no opinion on sources of phosphorus, and he did no
18 evaluation of the sources of phosphorus.

19 So to the extent there's a criticism on the sources
20 which we've heard on the allocation discussion -- and I'm going
21 to get into this in detail, Your Honor -- it's not supported by
22 anything the defendants' experts have provided.

23 THE COURT: Of course, it's always easier to play
24 defense than offense. Of course, they're not obligated to do
25 that, right?

1 MR. PAGE: No.

2 THE COURT: All they have to do is criticize your
3 guy.

4 MR. PAGE: But the point is this: I believe they're
5 not obligated in this trial in this court next month -- in
6 September to offer an alternative if they don't choose to. But
7 if they're going to criticize the results of our computer
8 modeler, saying it wasn't done right, it should have been done
9 differently, the results are flawed, they need to offer a model
10 that shows that. That would be the best and easiest way.

11 THE COURT: I don't think they're obliged to. One of
12 the real concerns here is the statements here that he ran these
13 different numbers, the S&P 500, through the model and it spit
14 out the numbers that, as Mr. George says, the model was
15 designed to spit out regardless of the numbers that were put
16 in. How do you respond to that?

17 MR. PAGE: I'll be happy to, Your Honor. Well, it
18 has to do with explaining, first of all, how the model works
19 and the methodology. And how Mr. George explained it I think
20 is not correct, Your Honor. But with regard to the defendants'
21 test, the defendants assumed new input data, 17 times the
22 amount of phosphorus from poultry, some hundreds' times amount
23 of data or phosphorus from wastewater treatment plants, where
24 they assumed they changed the delivery issue ratios over ten
25 years also.

1 Now, if you change the amount, that's changing the
2 GLEAMS input to the model, Your Honor. That's essentially
3 making changes either on the amount of wastewater treatment
4 plant input that was put in the allocation, wastewater
5 treatment plant input, or what's coming from GLEAMS.

6 If you change that, you would expect that there is a
7 change, then, at the gauging stations, which is what Dr. Engel
8 used. Dr. Engel used observed real data, what actually was at
9 Caney Creek, Baron Fork and Illinois River.

10 So if you change the inputs on the model -- and this
11 time I'm talking about the whole watershed model; that is, the
12 GLEAMS and the empirical routing model -- and don't take new
13 observations of what's coming out after it runs off the fields
14 and gets into the streams, then of course you have a different
15 model. They recalibrated to different numbers.

16 THE COURT: Well, but then it's not a model. I mean,
17 specifically, as I understand it, he increased -- Bierman
18 increased the point source discharge assumed in Engel's model
19 by 345 times to reflect that 97 million people were served by
20 the wastewater treatment plants that dump into the Illinois
21 River Watershed. And the models, when rerun with these
22 astronomical population figures, the results in terms of the
23 estimated P load to Lake Tenkiller didn't change materially.

24 You're telling me you have to go back and change the
25 USGS data. Well, but if that's true, then this isn't a model.

1 This is just spitting out the numbers that you want to spit
2 out.

3 MR. PAGE: That's not true, Your Honor.

4 THE COURT: Well, then why would you have to go back
5 in and change the actual data? I mean, this is modeling.

6 MR. PAGE: Because they went in and recalibrated the
7 model without taking new data from USGS. Your Honor, how
8 this --

9 THE COURT: But then it's not a model. You don't
10 have to take new data, right, to --

11 MR. PAGE: Yes, Your Honor. Let me explain how the
12 model works together. The model is the GLEAMS for the runoff
13 and an instream routing model that's empirical. How the model
14 works is, is we take actual -- Dr. Engel took actual observed
15 data, USGS data.

16 THE COURT: But then how -- it begs the question:
17 How can one predict in the future, then, without actual USGS
18 data? You're admitting that in terms of an attempt to predict
19 future outputs, the model is useless because you have to take
20 USGS data.

21 MR. PAGE: No, Your Honor. Let me please explain the
22 whole model, if I may.

23 THE COURT: All right.

24 MR. PAGE: When you take the GLEAMS outputs and then
25 you look at the actual observes so you know what's coming off

1 the fields for phosphorus, then you see what's observed after
2 all the water in the watershed is collected at the three
3 gauging stations, then you do what's called calibration. And
4 this is the flaw in their analysis. They didn't recalibrate.
5 You calibrate, then, the amount -- if your GLEAMS model says
6 500,000 tons is coming into the waters, but you're only seeing
7 400,000, then you calibrate the GLEAMS runoff component to
8 what's actually being observed.

9 So you use -- and Dr. Engel did that; appropriately
10 so. He did the calibration. So he then says, okay, well, I've
11 got too much runoff from fields. I've got too much from
12 swine. I've got too much urban. So he adjusts those based on
13 the observed data. So actually all of the instream processes
14 are actually accounted for. It's the most real method of
15 evaluating what's going on in the system because you're using
16 empirical observed data. You're not predicting --

17 THE COURT: I understand that, but you're talking
18 about what's going on in the system. How can one predict,
19 then, without -- because you and I are -- we don't have time
20 machines.

21 MR. PAGE: Sure. Sure.

22 THE COURT: We can't do that.

23 MR. PAGE: Absolutely.

24 THE COURT: So it is useless for future predictions
25 without real empirical data, according to what you're telling

1 me.

2 MR. PAGE: No, Your Honor. Now we know what's going
3 on in the system today based on the empirical data and the
4 GLEAMS. We know how much phosphorus is coming from poultry.
5 And I'll explain how that allocation goes.

6 THE COURT: No, no, no. I want to see how this works
7 in the future if I don't have to adjust my USGS. I'm trying to
8 figure out how you can increase population by -- to up to 97
9 million and still spit out the same number.

10 MR. PAGE: It's because they didn't change the
11 wastewater treatment plant input. See, Your Honor, in the
12 allocation and the analysis, Dr. Engel assumes all -- he has
13 actual wastewater treatment discharge for phosphorous data. He
14 assumes, giving the benefit to the defendants, that all of that
15 reaches the lake.

16 So if there was 97 million instead of 280,000 people,
17 there would be much more wastewater treatment plant discharge,
18 but they didn't make any -- the defendants made no
19 consideration of that fact. They used the same amount of
20 observed phosphorus going to the lake that's based upon 280,000
21 people when they put 92 million. Obviously, if you have 92
22 million people, you're going to have different observed data,
23 Your Honor, at the discharge point.

24 Now let me explain how it works for the future, how
25 the model works in the future.

1 The future predictions are based on this Court and
2 the plaintiffs wanting to ask the question: What will happen
3 if poultry production changes? It relates to poultry
4 production. So what happens is, is that the modeling scenarios
5 assumes existing conditions. And then we want to ask the
6 question: How do differences in poultry production change the
7 model outputs?

8 So one thing is, it's assumed that poultry production
9 remains the same, and that's one of the scenarios. And
10 Dr. Engel then keeps the poultry input from poultry the same,
11 and the model using past history predicts how changes in
12 poultry history or poultry production -- that is, no change --
13 will have an impact on the watershed if things -- business as
14 usual.

15 The second question is: What if poultry production
16 ceases? The Court enters an injunction, says there is a hazard
17 here, it needs to be stopped. Dr. Engel then eliminates
18 poultry production, an application in his model, current year
19 application, and the model then predicts what the impacts are.
20 And what you'll see is, is that coefficient that's described in
21 the model and also by other papers of the current year has an
22 immediate dropoff about 10 to 15 percent. Then over time, as
23 the phosphorus leaves the fields where it's been built up,
24 leaches out, goes into phosphorus, there's a decline in
25 phosphorus. That shows you, the Court, how to evaluate what

1 cessation of poultry waste.

2 Then there's another scenario that's growth. Let's
3 assume that the poultry industry continues to grow the next 20
4 years in the same way it grew in the last 20. So what would
5 that input. So then you add more poultry waste being applied
6 to the fields, and the model then predicts over time how that
7 change in production would have an impact on the IRW. So
8 that's how the model is used.

9 We also -- Dr. Engel also used the model to evaluate
10 certain potential remedial options. Buffer strips. He
11 evaluated buffer strips on third order in larger streams versus
12 on every stream in the watershed and predicted how that would
13 impact phosphorus in the future.

14 Now, while we're on this point -- I'm going to just
15 finish up, Your Honor. The defendants have criticized
16 Dr. Engel because he didn't understand what the weather is or
17 changes in population. We don't know, so how can we predict
18 the future? That wasn't the question being asked.

19 The question being asked, and I think what's relevant
20 to this Court is, how does poultry production potentially have
21 on the impact in the future. And if you add all those other
22 scenarios into the mix, then it confounds the evaluation as to
23 poultry production because you can only adjust one input, for
24 example, here to determine what that input's effect is going to
25 be. So that's how the model works in the future, Your Honor.

1 If I may, that covered one of my discussions today
2 and I'll --

3 THE COURT: I understand what you're saying.
4 Obviously, if I have arrived at a figure in terms of the
5 current effect of spreading of poultry waste on phosphorus
6 loads in Lake Tenkiller, I can very easily, if I'm only
7 focusing on two things, illumination, I used my static model, I
8 can predict what's going to happen, knowing that phosphorus
9 leaches out of soil slowly.

10 I can also predict, obviously, if I've got that
11 static model what's going to happen if I double -- not just
12 poultry production, but obviously you're talking about
13 spreading of poultry litter within the watershed. But once
14 again, that's a static model.

15 What concerns me here is that a model usually is
16 dynamic such that if I change an input, such as assumed in this
17 case the absurd figure of 97 million people adding phosphorus
18 into waste treatment plants, which is what I assume he did, and
19 he's telling me -- Bierman is saying it didn't change the
20 output.

21 Well, what that's telling me, that's telling me that
22 this isn't a dynamic model at all. This is simply a static
23 model, I've figured out what I think the contribution of -- and
24 clearly, there is -- I think we'd all stipulate, there is a
25 phosphorus contribution from poultry litter spread in the IRW

1 to Lake Tenkiller. We all know there's a problem. We can't
2 blind ourselves to it.

3 So the question -- see, the problem here then is,
4 isn't this a static model as opposed to a dynamic model?

5 MR. PAGE: No. As Dr. Engel points out at
6 paragraph 40 of his declaration, the defendants created a new
7 model.

8 THE COURT: Of the new declaration or the old one?

9 MR. PAGE: The new one. They are responding to this
10 test that Dr. Bierman provided. And that test is really on a
11 different model. They added the new inputs and they
12 recalibrated the model using the old observed data. That data
13 is not based on the conditions that were used for GLEAMS. So
14 it's a different model, Your Honor; it's not Dr. Engel's
15 model. They recalibrated it using new data, and that simply --
16 it just simply illustrates the lack of understanding and
17 knowledge that Dr. Bierman has.

18 They calibrated it keeping the old observations but
19 with new data. So it's a different model. It's not the same
20 model. That's the simple answer to their test, Your Honor.
21 It's not the same model.

22 Shall I proceed, Your Honor?

23 THE COURT: Well, once again, though, he's speaking
24 of the need to input observed data. I mean, how can one
25 predict in the future if one obviously doesn't have observed

1 data in the future?

2 MR. PAGE: Because in the future -- because,
3 Your Honor, you would -- well, you -- you've taken the observed
4 data, but if you look at the inputs --

5 THE COURT: We're modeling today, we're predicting
6 for the future. I don't have that observed date in the future.

7 MR. PAGE: Right. But they've recalibrated the
8 model, Your Honor. They didn't -- what Mr. George is saying is
9 not that simple. What Bierman did is recalibrated the model.
10 He didn't use Engel's model.

11 THE COURT: Calibration goes beyond me. You know,
12 the problem here is obviously we cannot jettison our
13 responsibility as officers of the court. And this is the
14 wrestling match that we're in here. We have to determine
15 what's reliable. And -- in any event, go ahead.

16 MR. PAGE: Your Honor, if I may just make a brief
17 suggestion. If there is anything that the Court is not
18 satisfied because counsel have not addressed completely -- I
19 have been in situations in the past where a short telephone
20 conference with the expert has occurred with counsel be their
21 lines, and you can ask Dr. Engel these questions yourself,
22 because clearly, Your Honor, I don't have a Ph.D. in
23 agricultural engineering like he does. I'm not the head of the
24 department at Purdue University. But he can answer these
25 questions.

1 Dr. Engel -- and he -- of course, his CV is part of
2 the existing report. He teaches watershed modeling at Purdue
3 University. He's the head of the department of agriculture and
4 biological engineering, which has been identified as the best
5 program in the United States. He has extensive experiencing in
6 develop -- experience on developing and applying models to
7 watersheds in agricultural situations.

8 He's modeled for the states of Indiana and Michigan,
9 USEPA, EPA, USDA, USGS -- he's done modeling for many
10 governmental agencies, Your Honor: USEPA, USDA, USGS and
11 NAPRA. And he's published over a 110 peer-reviewed articles on
12 modeling, runoff watershed modeling, Your Honor.

13 He's a member of the American Society of Agriculture
14 and Biological Engineers, which is the society of professionals
15 that deal with modeling issues such as the one presented here.
16 And that society awarded him the award as the best researcher
17 recently, and so did Purdue University award him as the finest
18 researcher within the university.

19 THE COURT: Purdue is certainly a great institution,
20 and I'm not one to reject modeling, computer modeling. In
21 fact, that's what my sister, I think I mentioned, got her
22 advanced degree in, hydro -- underground hydrogeology. That's
23 basically what they do, they model underground water. So it
24 certainly can be done. The question here is whether or not
25 this is reliable.

1 So --

2 MR. PAGE: I think that his abilities, Your Honor,
3 speak to -- should give the Court some comfort of reliability.
4 In fact --

5 THE COURT: Well, certainly his qualifications do,
6 but obviously the inquiry can't stop there.

7 Did anyone take the deposition of this then
8 25-year-old graduate student, who apparently now has his
9 doctorate?

10 MR. PAGE: He had his doctorate when he did the
11 work. He was a postdoc. And no one took his deposition,
12 Your Honor. But I think the characterizations that have been
13 put on Dr. Ji-Hong are inappropriate. In fact, Dr. Ji-Hong has
14 more experience in watershed modeling and in GLEAMS than
15 Dr. Bierman, the defendants' expert.

16 Your Honor, if I may go through and just point out to
17 the Court that Judge Eagan in the City of Tulsa case used
18 Dr. Engel as a special master to evaluate the modeling in that
19 case.

20 THE COURT: I take it we didn't have the same routing
21 model in that case.

22 MR. PAGE: No. In that case -- and one of the
23 problems was the routing equation. So if I may, Your Honor, if
24 I could explain a little bit about the model. The GLEAMS model
25 is a runoff model. It's specifically been designed for

1 phosphorus and nutrients. It's been widely used for
2 phosphorus. It's over 30 years old. It's been used in the
3 past specifically for poultry waste application in a
4 peer-reviewed article that's shown -- that's identified in
5 paragraph 31 of Engel's new declaration.

6 So this particular GLEAMS model has actually been
7 used in the peer-reviewed literature for poultry waste
8 application.

9 Dr. Engel himself has used the model for more than 20
10 years personally and has published several articles on its
11 application.

12 The EPA's analysis is true, but it's only part of the
13 truth. The GLEAMS model has actually been used as the runoff
14 component for watershed wide, what defendants' counsel called
15 off-the-shelf watershed wide models. The SWAT model, which is
16 one that's been used in this watershed as well as HSPF, use the
17 GLEAMS runoff component and then link it with an instream
18 component the same way Dr. Engel has done.

19 Now, the routing equation that's been used here is an
20 empirical model or equation. It has been used in other
21 contexts, in other watersheds. It's a typical method, as
22 Dr. Engel points out in paragraphs 20 and 21 -- excuse me, 11,
23 10, and 26 of his new declaration, but it's also in the
24 original report. The original report that's part of Exhibit B
25 to our response, Appendix D, pages 20 and 21, Dr. Engel

1 explains how routing equations such as the empirical one he
2 used in this case have been used by other watershed modelers in
3 conjunction with GLEAMS runoff analysis.

4 So when Mr. George, in the deposition of Dr. Engel,
5 asked him whether or not the empirical model tried to describe
6 or simulate -- simulate processes in the river, Dr. Engel said
7 no. There's no need to simulate what you already have observed
8 data for.

9 THE COURT: All right. How do you respond to the
10 criticism that there's no instream model; this is really a
11 forcing model?

12 MR. PAGE: It is a -- all models, Your Honor, are
13 mathematical equations. All models. All computer models are
14 mathematical equations. They're a series of equations.

15 THE COURT: I understand.

16 MR. PAGE: They have coefficients, ratios that are
17 based on other observations in similar circumstances to
18 describe processes such as how much phosphorus runs off from a
19 field or how much phosphorus is lost within the IRW.

20 Dr. Engel has studied the IRW and looked at the
21 data. His opinion is that all the phosphorous that gets in the
22 water so it runs off the field eventually gets into the lake.
23 That's his opinion.

24 So his question was not so much whether phosphorus is
25 really leaving the system. It's not like nitrogen where you

1 can actually lose from physical processes nitrogen through air
2 emissions. Phosphorus is conservative in the environment. So
3 the question is, is how fast is it getting through the
4 watershed into the lake? But it all will eventually get
5 there.

6 So what he did is did actual observations. He has
7 actual observations of USGS data for ten years, plus data that
8 was collected by the plaintiffs, the State in this case, and he
9 looked at those actual observations.

10 Those observations tell us exactly how long the
11 phosphorus is being delayed in the system.

12 That methodology avoids the problems of simulations.
13 There's no simulation. It's real. We know how long the
14 phosphorus leaving the field took to get into the lake because
15 we have an observation. We have GLEAMS telling us how much has
16 run off, and we have an observation telling us how much is
17 actually reaching there.

18 So that methodology, Your Honor, is not unique. It's
19 the same -- the routing equation is the same -- essentially the
20 same equation that USGS uses in its LOADEST. USGS does loading
21 calculations, they use regression analysis, and the routing
22 equation is the same type of equation.

23 Dr. Engel, in his new declaration as well as -- in
24 the paragraphs I just mentioned, as well as in Appendix D,
25 points out there's many, many peer-reviewed articles where they

1 use routing equations or empirical data to do the instream --
2 the river instream analysis.

3 So it's not new analysis, it's not junk science.
4 It's part of what the modeling community for watersheds
5 typically does.

6 Dr. Storm did a TMDL analysis for this watershed in
7 2006. He testified and noted, and Dr. Engel talked with him
8 about that, that he used a mechanistic aspect. So he used
9 GLEAMS for runoff, which is part of SWAT. And then he used a
10 mechanistic model which tries to simulate what's going on. And
11 it wouldn't work; he couldn't get it to calibrate.

12 Dr. Engel knew that in 2006, reviewed the work and
13 determined that the best and most reliable method to determine
14 how phosphorus is traveling in the rivers and streams is to do
15 empirical observations.

16 Your Honor, if you know exactly what's going on in
17 the river or stream, you don't need to model it. You know
18 exactly how the transport of the phosphorus is going on from
19 the edge of field because we have empirical data.

20 So it's not unusual; in fact, it's standard to link
21 GLEAMS with a routing or empirical model. Again, I've already
22 mentioned that SWAT does this and so does HSPF. Dr. Engel
23 points out many papers in paragraphs 10, 11 and 19 of his
24 declaration and his original report on Appendix D, pages 20
25 through 21 and 39 describe this methodology as being reliable,

1 standard use in the watershed modeling business.

2 Dr. Engel -- actually, there's a Dr. Chauby,
3 Your Honor, who used to be at the University of Arkansas, he's
4 also a Ph.D. agricultural engineer who's done research at the
5 University of Arkansas on this watershed in particular, and
6 also does watershed modeling regularly.

7 During his deposition -- we've attached that as
8 Exhibit E to our response in docket 2158 -- Dr. Chauby says
9 linking GLEAMS with an empirical model -- routing model that
10 was done -- as done by Dr. Engel is typical and reliable
11 methodology.

12 So we have a nonretained expert who was deposed in
13 this case who was asked specifically about Dr. Engel's
14 methodology, and he validated it.

15 Now, Your Honor --

16 THE COURT: Mr. Page, we've been going here for a
17 while, and although it is my intention here to go for a while
18 longer, I think I need to take a break for everyone concerned
19 here. Let's take a short recess. We'll go until about 12:30,
20 then we'll recess for about an hour until 1:30, and then we'll
21 go the rest of the afternoon.

22 (Whereupon a recess was had.)

23 THE COURT: Mr. Page.

24 MR. PAGE: During the break, my colleagues informed
25 me that I'm not doing a very good job articulating the

1 empirical model. I'm going to try one more time because I
2 think confusion rests on my inability to articulate, and I
3 apologize for that.

4 THE COURT: Don't underestimate the ability of this
5 Court to confuse entirely clear and lucid argument as well.

6 MR. PAGE: This is indeed, Your Honor, complex,
7 but -- particularly for most liberal arts people like myself.
8 But let me say this another way.

9 THE COURT: I remember Mr. Page at the student union
10 at the University of Tulsa both of us being liberal arts
11 people, how we've gotten into a new area here, Mr. Page.

12 MR. PAGE: Yes, sir. Your Honor, the empirical
13 observations are the new coefficients -- are the coefficients
14 for this model. So instead of guessing as to what those
15 coefficients would be, that is what's lost in the system, what
16 the timing is, we have empirical observations.

17 Engel uses those empirical observations to then
18 calibrate his model. After you do that, then you run the
19 model. You don't take new observations; you run the model.
20 You know how much is coming out of the fields. You know what's
21 not making it to the lake during that year because you've got
22 ten years of data. You've calibrated and validated. So then
23 you just run the model. So when you do a future analysis, you
24 put in new inputs. You don't take new observations. You don't
25 need new observations. Those observations were used to create

1 the coefficients.

2 THE COURT: But see, that's what I understood.
3 That's why I asked the question of predicting future phosphorus
4 loads in Lake Tenkiller if one takes the preposterous
5 assumption here that defendants' experts did, that you'd have
6 97 million people pumping waste into these wastewater treatment
7 plants. Why was that not accurate? Why did it pump out
8 essentially the same numbers that it's pumping out now?

9 MR. PAGE: Because they didn't run the model. They
10 pumped in 97 million people and assumed an observation. They
11 didn't run the model with the new coefficient based on the
12 observations. They used that same observation. It's not the
13 same model. They forced the model; we did not force it.

14 THE COURT: I see. So once you pump the new data in,
15 then you've got to take your USGS data out and allow -- will
16 this model give you new figures if you take it out?

17 MR. PAGE: You don't take it out. The data was used
18 for the equation. The data -- USGS data was used so Dr. Engel
19 would know how much phosphorus is being lost from the edge of
20 field until it got into Lake Tenkiller. That was the
21 coefficient.

22 THE COURT: Well, their explanation or their argument
23 is it doesn't only recognize phosphorus loss from edge of
24 field; it also recognizes phosphorus from other sources,
25 right?

1 MR. PAGE: That's correct.

2 THE COURT: Okay. All right. I understand the
3 relevance of an empirical model. But that, again, assumes that
4 you're correct in your original assumptions with regard to
5 contribution from edge of field to Lake Tenkiller.

6 How do you respond to the arguments that Dr. Engel
7 made a number of assumptions without basis, that cattle grazing
8 in fields that have access to first or second order streams
9 cannot contribute phosphorus? With respect to pastures
10 adjoining larger streams, that only the manure deposited by
11 cattle within 20 meters of those streams could be transported?
12 That based upon Ed Fite's windshield assessment -- and I'll
13 tell you, I don't know Ed Fite, but I guarantee you in terms of
14 windshield assessments, his is probably the best you could
15 get. But based upon that windshield assessment that 45 percent
16 of the cattle grazing on pastures that adjoin larger streams
17 and rivers cannot deposit manure in or near streams because
18 they've been fenced out of those areas, assuming that all
19 litter generated in the IRW is applied in the IRW, assuming
20 that every parcel of land in the IRW identified as pasture land
21 received poultry litter application every year, etcetera?

22 I mean, doesn't that call into question the validity
23 of the percentages of contribution of poultry waste in this
24 model?

25 MR. PAGE: You asked a lot of questions, Your Honor,

1 and I'm prepared to identify each one.

2 THE COURT: It's basically just one question.
3 Basically it undermines the reliability of the conclusion with
4 reference to the percentage that only an application of poultry
5 litter contributes to phosphorus in Lake Tenkiller.

6 MR. PAGE: All those statements are unsupported by
7 any scientific analysis; every one. They didn't cite one
8 peer-reviewed article. They have no test of the model saying
9 that any of those assumptions would make a difference in the
10 output for Dr. Engel's model.

11 If they claim they ran the model, then why didn't
12 they change the input and say, see, it changes the difference?
13 They don't provide that, Your Honor.

14 THE COURT: So to you -- this model has not been peer
15 reviewed, correct?

16 MR. PAGE: The methodology, the way the model works
17 has been well peer reviewed in the peer-reviewed literature.
18 It has been -- the whole methodology of using GLEAMS and then
19 using an empirical data to determine what happens in-stream,
20 there's volumes of peer-reviewed articles that have done the
21 exact same thing, Your Honor, the exact same thing.

22 If I may address what I think is the second point of
23 my argument which goes to the application. You're asking some
24 questions concerning whether the modeling assumptions were
25 properly applied.

1 THE COURT: Yes, sir.

2 MR. PAGE: I think it's important, Your Honor, to
3 note that Dr. Engel followed a written protocol that's part of
4 his report, the original report, and it's also mentioned in how
5 he followed those steps in his new declaration in paragraphs 9
6 through 11, 19 and 26 and 27. That modeling protocol was also
7 set forth very clearly in his original report in Appendix D,
8 pages 37 through 43.

9 That protocol, Your Honor, is based on a peer-
10 reviewed, published article that Dr. Engel published in 2007.
11 So he has a protocol for when you do sensitivity analysis, when
12 you evaluate the different inputs. He set it out. It was
13 clearly in his report, and he followed it, and it was based on
14 his own peer-reviewed publication that was recently published
15 in the American Society of Agricultural Engineers.

16 Now, some of the issues that you just raised and the
17 defense raised has to do with allocation. Allocating
18 phosphorus. I'd like to talk about that now, Your Honor.

19 First of all, I think it's important just for me to
20 briefly point out to the Court that that was one of the
21 purposes for the model in the first place was to provide an
22 allocation in addition to the other allocations provided in
23 Dr. Engel's report at other sections.

24 What he found was 45 percent of the phosphorus
25 entering Lake Tenkiller from 1998 to 2006 was based on poultry

1 application. And 59 percent was 2003 to 2006. The difference
2 is, is in 2003, there was some major changes in wastewater
3 treatment discharges in Tahlequah and Springdale, so that
4 accounted for the differences.

5 THE COURT: But you say that was one of the purposes
6 of the model. Mr. George says that these percentages are not
7 the output of the model but, rather, were calculated by
8 Dr. Ji-Hong outside of the model.

9 MR. PAGE: They weren't calculated by Dr. Ji-Hong
10 outside of the model; they were calculated by Dr. Engel, who
11 did all of the allocation analysis himself. Dr. Ji-Hong
12 assisted him with that analysis.

13 Let me explain how allocation was done in this case
14 and how it was done with the model. And, Your Honor, if I may
15 point out to you that a question was asked of Dr. Storm in his
16 deposition -- he's an OSU professor who's done modeling of this
17 watershed, he's doing TMDL for the State of Oklahoma now on
18 this watershed, he's an unretained witness. Exhibit F of
19 docket 2158. In his deposition, he agreed with Dr. Engel's
20 allocation process which I'll explain to the Court.

21 THE COURT: Page and line?

22 MR. PAGE: I'm sorry, Your Honor, I didn't put that
23 in my notes.

24 THE COURT: Go ahead.

25 MR. PAGE: I can find it for the Court.

1 This is how allocation was done in this case with
2 regard to wastewater treatment plants. We had actual data of
3 discharges of phosphorus from wastewater treatment plants
4 within the watershed for every wastewater treatment plant.

5 Dr. Engel assumed all wastewater treatment plant
6 phosphorus is getting into the river and into the lake. So if
7 anything, it's overstated how fast it's moving down into the
8 river, but that's assumed. So we used actual phosphorus
9 numbers from wastewater treatment plant.

10 So initially, then, that means you have to allocate
11 the rest of the phosphorus that you're seeing at Lake Tenkiller
12 back into non-point sources such as poultry and cattle.

13 For cattle, he did an analysis that was separate that
14 recognized, along with other peer-reviewed articles in this
15 watershed that I've already discussed with the Court, that
16 cattle was primarily recycling phosphorus, primarily recycling
17 phosphorus. So that he then evaluated cattle's contribution as
18 simply a movement of the cattle closer to the streams.

19 Now, how do you then allocate the rest of the
20 non-point source? What you do, Your Honor, is you know how
21 much phosphorus is coming in from non-point sources because you
22 subtract it from all the phosphorus you're observing in the
23 model to -- with -- from the wastewater treatment plant
24 contribution. That gives you your non-point source. You
25 allocate cattle, and the balance is -- are the rest of the

1 sources. You turn off poultry. You turn off poultry inputs on
2 the model, then you subtract the results for the model for
3 poultry -- without poultry from the model run with poultry, and
4 the difference gives you your poultry contribution. It's a
5 rather simple equation that's done.

6 And Dr. Storm says that is how allocation is
7 performed in watershed models. And Dr. Engel cites at -- in
8 his declaration on paragraphs 12, 13 and 32 several
9 peer-reviewed articles that use the same methodology of
10 allocation as he employed in this case.

11 So that's the first important point on allocation.

12 THE COURT: If I'm correct now, we've referred now in
13 this most recent declaration that I struck Friday paragraphs
14 10, 11, 12, 13, 19, 21, 26, 31, 32, 27 and 41? Any others that
15 we want to refer to?

16 MR. PAGE: Your Honor, what I've done is I've made
17 note of these paragraphs based on our telephone conference
18 where you said you wanted to be able to identify in the record
19 in my argument. I can go through here as we go through, but
20 I'm trying to --

21 THE COURT: I'm trying to keep track here. Go ahead.

22 MR. PAGE: So, Your Honor, when Dr. Engel did his
23 allocation, he used a methodology that was used by other
24 modelers. Dr. Storm agrees with the methodology, and he
25 provided peer-reviewed papers that show that that methodology

1 is appropriate.

2 The sources that the defendants claim are important
3 are not important. For example, they claim that stream bank
4 erosion wasn't considered by Dr. Engel. Dr. Engel explains
5 that stream bank erosion simply represents other contributions
6 to the soil or background, so you don't need to separately
7 allocate that.

8 Second, septic tanks. Dr. Engel, in his report at
9 Appendix D and G, points out that septic tanks are very minor
10 sources. They're less than one percent, so they're not
11 important to be considered separately in the model.

12 THE COURT: I haven't read that particular part of
13 his deposition, but is that an overall calculation from proper
14 septic laterals or is that specifically septic tanks and a karst
15 topography?

16 MR. PAGE: That's a septic tank evaluation that's
17 based on reports from the IRW and these conditions when they
18 looked at failures. There's been some -- I believe it's
19 Conservation Commission and other reports that have talked
20 about the amount of septic tanks that are in the watershed and
21 then predicted the amount of failures.

22 So he evaluated septic tanks and determined that they
23 weren't a significant contributor to phosphorus when you
24 compare it to all the other contributions in the mass of
25 contributions going in.

1 And Dr. Storm, in his deposition, Your Honor -- and,
2 again, it's Exhibit F to our response -- agrees. He also does
3 not, in his TMDL model, separately allocate to septic tanks
4 because he says they're insignificant sources.

5 Another source that the defendants claim should have
6 been --

7 THE COURT: Do you understand why septic tanks would be an
8 insignificant source in the IRW?

9 MR. PAGE: Number of people. You can look at --
10 500,000 pounds of phosphorus on average is what's going into
11 the -- into the Lake Tenkiller.

12 THE COURT: The testimony before me at the
13 preliminary injunction hearing is that actually this area, at
14 least at the time, was undergoing a boom in terms of housing.

15 MR. PAGE: Your Honor, the mass balance analysis that
16 Dr. Engel performed as part of his analysis shows -- considers
17 not just wastewater treatment plant and septic but considers
18 all people's contribution to phosphorus into the watershed.

19 And the contribution is, if I recall, about 6
20 percent, 7 percent. The number of people -- that includes
21 wastewater treatment plant, which is primarily where the urban
22 areas are. If you look at the septic tank usage, it's a very
23 small proportion of the population.

24 So you have that amount of the population of pounds
25 of phosphorus from people, and then you look at the amount of

1 phosphorus that's in 350,000 pounds of poultry waste, and
2 that's 9 million pounds a year.

3 THE COURT: Of phosphorus.

4 MR. PAGE: Of phosphorus. So when you look at the
5 relative contributions of these different sources, as Dr. Engel
6 and Dr. Storm at OSU have done, they determined that septic
7 tanks are not an important source of phosphorus to the system.

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9 been --

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4 poultry waste, and that's 9 million pounds a year.

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6 MR. PAGE: Of phosphorus. So when you look at the
7 relative contributions of these different sources, as Dr. Engel
8 and Dr. Storm at OSU have done, they determined that septic
9 tanks are not an important source of phosphorus to the system.

10 Another source that defendants rely on -- and they
11 have a Dr. Jarman who provides this information -- was sewage
12 bypasses. See, Dr. Engel's report only has to do with typical
13 or normal wastewater treatment plant discharges, as are
14 permitted and based on records. They said, well, what about
15 sewage bypasses? That's an important source. Well, Dr. Jarman
16 says the amount of phosphorus in a sewage bypass -- that is, if
17 it rains a lot and is a big flood, then they can't handle the
18 discharge, it overflows -- is a hundred pounds a year. That's
19 their own expert's testimony.

20 Dr. Engel says -- when you consider about 500,000
21 pounds of phosphorus going into the lake each year, and that's
22 not a disputed number, Your Honor, in this case, on average,
23 100 pounds from a sewage bypass is de minimis.

24 What about commercial fertilizer? Dr. Engel
25 explained, and his model explains in Appendix D, that

1 commercial fertilizer is represented by crops. He has crops
2 contributions. There are some row crops as part of his
3 analysis, so that's represented by crop input. So commercial
4 fertilizer wasn't ignored. It was represented in the model by
5 crop applications.

6 THE COURT: Remind me, in the IRW, what percentage
7 approximately is crop land as opposed to pasture? Because as I
8 recall, the testimony is that this is primarily pasture land.

9 MR. PAGE: Yes, it's 2 to 3 percent. Very, very
10 small. Less than 5 percent, Your Honor.

11 So then we come back -- I think I need to talk a
12 little bit more about cattle. As I pointed out, Your Honor,
13 Dr. Engel applied 6 percent of the results to cattle,
14 recognizing that they're primarily recycling. That relates to
15 6.9 percent in the mass balance. It's confirmed by it.

16 Other -- the defendants like to point out that
17 Dr. Storm, in his TMDL model, had 21 percent attributed to
18 cattle. They say, look, if Engel's only providing 6 percent,
19 why 21 percent for Storm? And the reason is this: Dr. Storm
20 did not consider the concept of recycling.

21 THE COURT: Right.

22 MR. PAGE: And he agrees at Exhibit F -- and here I
23 do have the pages -- pages 224 to 226 of Storm's deposition, he
24 agrees with Engel's approach on cattle, that if you -- and he
25 agrees that cattle do recycle, but he was attributing current

1 year and contributions from cattle because his question was
2 different. His question was, for the TMDL: What can we do
3 managementwise to affect the different inputs? And he wanted
4 to know what the contribution of cattle was, even though it's
5 recycled poultry, to the input in any particular year. So
6 Engel and Storm have consistent results, depending on the
7 question you asked and asking.

8 Now, Your Honor, the allocation that Dr. Engel
9 performed is consistent with all the other lines of evidence.
10 And part of any model's analysis is, okay, how does it relate
11 to the observed and other lines of evidence in this watershed.

12 THE COURT: Back up just a minute. I'm looking at
13 224 to 226. And I don't see any reference to recycling in the
14 Storm deposition.

15 MR. PAGE: In that portion, he was talking about how
16 cattle is being calculated, but Dr. Storm, I believe in another
17 part of the deposition, agrees that it is recycled. I don't
18 believe there's any researcher in this watershed who has not
19 conceded, that I'm aware of, that the cattle are simply
20 recycling poultry phosphorus that's been applied to fields.

21 THE COURT: Storm's concession is not here on 224 to
22 226, correct?

23 MR. PAGE: His -- on 224 to 226, he's describing what
24 he believes as -- Dr. Engel's method of allocation to cattle as
25 being reasonable.

1 THE COURT: Go ahead.

2 MR. PAGE: When you consider, Your Honor, that
3 there's 9 million pounds of phosphorus being applied to the
4 watershed each year, it's not, then, unusual to find that
5 current allocation to poultry is 59 percent of the phosphorus
6 going into Lake Tenkiller.

7 I talked to you earlier about the delivery
8 coefficients, that there's been studies done in the watershed.

9 I'm sorry. I've been handed by counsel, Your Honor,
10 pages 16 through 29 of the deposition deal with recycling of
11 cattle.

12 I'm sorry, Your Honor, it's page 225, lines 16
13 through 29. I can't read the handwriting. I apologize. I
14 think if we all work together, we'll get it. It's page 225,
15 lines 16 through 25 where Dr. Storm speaks of recycling by
16 cattle.

17 THE COURT: Go ahead.

18 MR. PAGE: I apologize, Your Honor, I just couldn't
19 recall that a minute ago.

20 These coefficients, there's been observations by
21 researchers saying if you put so much poultry waste on the
22 field, how much will run off in that year. And I mentioned
23 earlier that most researchers find 5 percent. Dr. Engel's
24 model, computer model, shows that 3 percent of the applied
25 poultry waste each year is running off into Lake Tenkiller.

1 There's been all these other studies that I've
2 already discussed with the Court that verify that poultry and
3 nonpoint source contributions are the majority of phosphorus in
4 the IRW, streams, rivers and going into the lake.

5 So, Your Honor, there's another study that Dr. Engel
6 evaluated that goes to the reasonableness of assuming that
7 poultry waste is affecting the streams, and that was a poultry
8 house density analysis that's part of his report.

9 It's an interesting study where the amount of poultry
10 houses within subwatersheds was evaluated and compared to the
11 concentration of phosphorus in streams that are drained -- that
12 are drained in that particular watershed.

13 And what Dr. Engel's analysis demonstrated is that
14 the higher the poultry house density is in the subwatershed,
15 the higher the phosphorus concentration is in the streams of
16 that watershed. But not only that, Your Honor, it's not just
17 nonpoint source runoff. It wasn't just during just high flows
18 was that correlation seen; it was also seen in low flows, which
19 indicates that poultry house contributions get into the
20 subsurface waters even during non -- after rainfall events and
21 eventually leach in or travel through the springs of the IRW in
22 low flow or base flow conditions.

23 So the reason I'm pointing these out to the Court is
24 that all of these validate the methods and the results received
25 by Dr. Engel in his computer model.

1 I think, Your Honor, the defendants also pointed out
2 in their papers that Dr. Storm has a different poultry
3 contribution than Dr. Engel. That Dr. Storm, in his 2006 TMDL,
4 had only 15 percent; and Dr. Engel's is 45, or at the
5 wastewater treatment plant is changed to 59.

6 Dr. Storm points out in his deposition at pages 38
7 through 40 -- again, those were attached -- that he wasn't
8 considering -- when he figured it was 15 percent, he was only
9 considering the current year contribution of phosphorus. He
10 wasn't evaluating the built-up phosphorus from past years of
11 poultry house contributions or other land uses to the
12 contribution.

13 So if you take that out of Engel's analysis, then
14 Engel concludes that 18 percent of current year phosphorus is
15 coming from poultry houses or poultry application, and Storm is
16 to 15. So that's a very reasonable comparison. See Storm was
17 not looking at the STP values when he came up with his poultry
18 contribution. Again, he was looking at current management
19 practices that could be changed for the TMDL.

20 So Dr. Storm's analysis actually confirms Dr. Engel's
21 analysis when you look at current applications and
22 contributions.

23 I think, Your Honor, in summary for the allocation,
24 is that all the evidence, I believe, supports Dr. Engel's
25 allocation based on the computer model.

1 There's no contrary allocation offered by the
2 defendants, probably because it's overwhelming, the historical
3 research and all the work that has been done by Dr. Engel and
4 others in this case identifies poultry contribution as the
5 primary and certainly a substantial contributor of phosphorus.

6 Now, another criticism that Dr. -- I think it was --
7 I don't know if it was Dr. Bierman who raised this, but
8 certainly Mr. George raised it, was concerning how litter was
9 applied. And there was several minutes of discussion between
10 the Court and Mr. George about litter application.

11 They were concerned about -- one point was that the
12 -- all of the litter gets applied at one time of the year.
13 Dr. Storm agrees with this analysis. He points out, and
14 Dr. Engel points out, that it makes no difference in the GLEAMS
15 model if you apply all of the poultry waste on one day of the
16 year. He's worked with this model for years. The model is
17 built for nutrient runoff of fields. It makes no difference.
18 It has no impact on the model. Storm agrees; it's in Exhibit
19 F, deposition pages 107 to 108 and 139 to 140.

20 Also, that Dr. Storm agrees with all the other major
21 waste management assumptions that were made by Dr. Engel. In
22 his deposition on page 133, he agrees that Dr. Engel used the
23 proper amount of active poultry houses. Dr. Storm has found
24 that there are 71 percent of active poultry houses, and
25 Dr. Engel has found there's 70 percent of poultry houses in the

1 IRW are active. That's an important analysis.

2 Dr. Storm also agrees that we shouldn't consider
3 exported litter out of the watershed. On pages 134, 135, he
4 says he didn't assume exported litter either. The explanation
5 for both of the doctors is as what the Court expected, it costs
6 too much to export it.

7 The evidence is undisputed that most poultry waste is
8 applied within three to five miles of 80 percent of the five
9 miles from the poultry house.

10 And the other point is that even with the government
11 programs that have underwritten some poultry waste being moved
12 out of the watershed, there's also poultry waste being moved
13 into the watershed.

14 So Storm and Engel agree that it's not appropriate to
15 think about removing waste because of being exported out of the
16 watershed.

17 THE COURT: Does the State track poultry waste being
18 brought into the watershed?

19 MR. PAGE: No. See, that's the problem with the
20 numbers that we were looking at a few minutes ago, Your Honor,
21 is that those records by either the State of Oklahoma or
22 Arkansas are not complete as to all land application. Land
23 application records are not required for all land application.

24 The reason that was put in Dr. Engel's report, where
25 we have a record of, it's clearly undisputed that there's at

1 least this much waste applied for each of these defendants
2 because we have a record. But we also have the studies that
3 show that poultry waste is applied very near to the house where
4 it was generated because of economic issues.

5 And Dr. Storm as shown on pages 135 and -36 and -38
6 of his deposition, also agrees that it's fair to assume that
7 poultry waste should be applied near -- and assumed in the
8 model -- applied near the poultry house where it is generated.

9 Now, in contrast, Your Honor, Dr. Bierman made no
10 study at all in his work and offers no opinion on poultry waste
11 generation, management or disposal methods. So that the extent
12 he has a criticism, he has nothing, no study, no analysis that
13 would support his criticism.

14 I think -- I tried to address the Court's issue on
15 the future modeling application. I pointed out that once you
16 have the model in place, it is -- you have to unplug -- the
17 defendants, they had the model -- they say they had the model,
18 they were running it, so they should have unplugged the
19 historical observed data and let the model then predict what
20 94 million people -- impact would be on discharges to the
21 lake. They didn't. They forced it using the old historical
22 observations that were used simply to calibrate and understand
23 how fast the phosphorus leaving the fields gets into the lake.

24 So I won't -- I also talked about, Your Honor, how
25 the future analysis was done and why you only look at poultry.

1 You change that because you'll confound the analysis. But I do
2 want to point out for the Court that when Dr. Engel did his
3 historical evaluation, he used the data on census, for both
4 animals and people in the watershed that was created in detail
5 in the mass balance analysis. So it was based on the same
6 data, same type of data that he used.

7 He was able then to generate poultry production and
8 waste amounts. And he did use historical weather data, because
9 we had it, when he did his historical evaluation. He did use
10 historical population data.

11 So even though in the future we allocate and evaluate
12 the effects of poultry application based on changes in the
13 methods of poultry production, for the past we have the data,
14 and it was used for his historical analysis and projections.

15 He also used that same data to determine what the
16 lake would look like if poultry had never been involved to the
17 extent it has in this watershed, what would the water
18 concentrations and loading be for the lake.

19 I think I've talked a little bit about the
20 sensitivity analysis. Let me explain sensitivity analysis as
21 I've learned it through this and some other cases.

22 After you've calibrated and validated your model,
23 then you perform the sensitivity analysis if you believe it's
24 necessary for the model. And that is -- what I've stated
25 there, Your Honor, is pretty much black-letter law from the

1 modeling community. You'll note that the -- even the EPA
2 guidance that the defendants cite, which is a guidance for all
3 models and very briefly talks about watershed models, it's a
4 model -- it deals with models for air and all other types of
5 modeling scenarios. It doesn't say you have to do sensitivity
6 analysis; it says you may wish to do sensitivity analysis.

7 THE COURT: All right. Two points. The defendants
8 point out that Engel testified in the City of Tulsa case with
9 regard to the importance of conducting sensitivity analysis on
10 hydrologic models; and then, secondly, admitting that he has
11 conducted no sensitivity testing here.

12 MR. PAGE: Right. The City of Tulsa case was based
13 on a different model, Your Honor, that had many more
14 assumptions in the instream portion. His concern was -- in
15 that case was the instream portion, but it was also a concern
16 about whether swine made a difference or not in that case.

17 Dr. Engel pointed out that, in that case, the City of
18 Tulsa case, the modeler did not consider pigs or swine. In
19 this case, Dr. Engel included pigs and swine in his analysis.
20 So the issue of sensitivity in that case has been resolved by
21 Dr. Engel in this case.

22 Also, Dr. Engel is well aware, and the research
23 community that works with GLEAMS has a strong and -- very
24 strong understanding of how GLEAMS works. It's been around for
25 30 years.

1 Sensitivity analysis is once you've got your model in
2 place, calibrated and validated, then you change one input a
3 very small amount and see if it has any impact on the results
4 you received for your model. So that's to see whether or not,
5 for example, your soil analysis inputs are correct, those
6 different coefficients are correct.

7 Dr. Engel pointed out that he has used this model
8 many times. He understands what's sensitive, and he knows that
9 the different parameters that were used would not show a impact
10 based on the sensitivity analysis.

11 He also demonstrated the lack of need for sensitivity
12 analysis in Appendix D in the protocol that he put in his model
13 initially. And the sensitivity analysis was not required.

14 Dr. Engel, in his protocol paper that was published
15 in 2007, as well as in Appendix D, points out that sensitivity
16 analysis is needed when a modeler is not familiar with the
17 model and does not know enough to recognize what inputs will
18 have a substantial input and make a sensitive import to the
19 results.

20 So -- and also, Your Honor, I think it's -- again, I
21 want to point out that the EPA document they're relying on is a
22 guidance document that has that disclaimer and doesn't just say
23 it's not legally valid, but the EPA says, we may not even be
24 bound by everything we say in here, depending on the
25 circumstances.

1 And that was a very generalized modeling guidance
2 that deals with anything from water to lake, runoff, as well as
3 air modeling, Your Honor. It's a very generalized application
4 of -- to the modeling community.

5 We've talked about the defendants' test. They should
6 have unplugged the so-called end-of-the-stream data. They
7 didn't use the model that Engel created. They forced it and
8 took his model and changed it. They put -- they continued to
9 use the historical observations which were used to set up the
10 routing coefficients and not intended to predict what all the
11 future would be.

12 So therefore, Your Honor, what I tried to point out,
13 not very artfully earlier, is that it was not the same model
14 when they ran their so-called test.

15 Now, if I can go to the point of whether the model
16 has been tested or not.

17 THE COURT: We're at 12:30, and I promised everyone
18 we'd take a break. Bear in mind, as you think about the
19 remainder of your argument and then, of course, because it's --
20 well, of course, we have cross-motions here of Bierman and
21 Engel. I don't know how we're going to handle that.

22 Obviously if you, Mr. Page, wish to reply with regard
23 to Bierman, you may, but we need to move on. We've got lots of
24 motions here, and we haven't even decided one yet today. We're
25 halfway through the first of two days.

1 Let's take an hour recess for lunch. We'll be back
2 here at 1:30.

3 (Whereupon a recess was had.)

4 THE COURT: Mr. Page.

5 MR. PAGE: Thank you, Your Honor. I just have a few
6 more minutes, and I'll wrap up my presentation.

7 Your Honor, one of the Daubert criteria is whether or
8 not the particular methodology can be and has it been tested.

9 The model that was created by Dr. Engel is capable of
10 being tested and, in fact, was tested during the calibration
11 and validation process.

12 Calibration, Your Honor, is once you've set up your
13 model and you've got your inputs and you've got your -- you're
14 using the observed data for your routing, then you test; that
15 is, you check the observed data to identify your inputs. So
16 calibration process is to adjust your inputs to match the
17 observed data. And then you then know, based on your observed
18 data, how much is actually working its way through the
19 watershed in timing. You then know how much needs to go on
20 from the GLEAMS model to make the model meet real data.

21 Then the validation process Dr. Engel did following
22 his protocol, you take another set of observed data and you run
23 the model based on the observed loadings. But you don't use
24 the observed data that originally set up your model; that is,
25 the inputs, you just see whether the model will predict the

1 other observed data, and it did. And that's the validation
2 process.

3 So this model worked, and it wasn't -- calibration is
4 not a random adjustment, as pointed out by the defendants.
5 It's a very specific, careful adjustment that's done using the
6 observed data, adjusting your inputs. And then you use
7 additional observed data, which Dr. Engel did, to see now that
8 he's got the model set up using the empirical routing model,
9 does it work for other observed data. And it does.

10 He changes the inputs for wastewater treatment plant,
11 the other poultry applications, all the inputs go in the GLEAMS
12 part of the model, use those to subsequent years and see what
13 the model outputs are going to be, and then compares that to
14 the observed data going into Lake Tenkiller, and they matched.
15 And his report in Appendix D explains the calibration and
16 validation process.

17 So I think this model clearly meets the Daubert
18 criteria of capable of being tested and was, in fact, tested.

19 And again, Your Honor, all this is set out in
20 Appendix D to the original report, which is Exhibit B to our
21 analysis.

22 The defendants argue that there should have been a
23 calibration to the edge of the field. That's one of their
24 arguments. The model was calibrated adds to the key point,
25 that is the river meeting -- entering into the -- into the Lake

1 Tenkiller.

2 The defendants offered no peer-reviewed article that
3 would suggest that was necessary; that is, calibrate to the
4 edge of the field. And, in fact, other modelers who have done
5 watershed modeling have actually employed the same methodology
6 as Dr. Engel, as shown in the peer-review literature that
7 Dr. Engel points out.

8 So in summary, Your Honor, the model is properly
9 tested and calibrated and was properly performing and can
10 properly perform in this case as a reliable model.

11 We've talked a little bit about peer review. The
12 methods in the application, all the methods and application
13 that were used by Dr. Engel to create this model and how it was
14 applied have been the subject of peer-reviewed articles. So he
15 can support all of his application through peer-reviewed
16 articles.

17 Your Honor, I'm not aware of a situation where you
18 have to peer review each expert report in court. I mean, you
19 don't need to publish an expert report in peer-reviewed
20 articles.

21 What the question is: Are the methodologies and the
22 application of methodologies peer reviewed? And they have been
23 by many watershed modelers in many circumstances.

24 THE COURT: Now, the routing model, the equation
25 developed by Dr. Ji-Hong.

1 MR. PAGE: It was Dr. Engel, Your Honor.

2 THE COURT: I'm sorry?

3 MR. PAGE: Dr. Engel created the equation.

4 THE COURT: Well, except -- all right. So let's say
5 both of them -- now, that's not been peer reviewed, correct?
6 And you're saying -- and I understand, it's not an absolute
7 requirement of Daubert that it be peer reviewed, but I don't
8 have a sense of how unique this particular routing model is.

9 MR. PAGE: Well, it's the same concept, and I would
10 say method, as the USGS LOADEST that's used in the IRW. It's
11 an equation that explains what's happening to the phosphorus as
12 it moves through the stream, and it gives us the timing from
13 the edge of field to it.

14 So what's been peer reviewed is other scientists
15 taking the same type of data as Dr. Engel have used instream
16 empirical models with their models and published those
17 results. So the modeling community recognizes the methodology
18 and the application in peer-reviewed scientific journals that
19 has been used by Dr. Engel in this case.

20 THE COURT: The other major concern I have here is
21 with regard to the quantitative opinions concerning the
22 relative contribution of poultry litter. In his deposition,
23 Dr. Engel first said, "It looks like that may have been
24 something that was not fully addressed in the rush to meet the
25 deadline." And apparently Dr. Ji-Hong did do most of the work

1 relative to the load allocation work; is that correct?

2 MR. PAGE: No, Dr. Ji-Hong assisted Dr. Engel. And I
3 think --

4 THE COURT: To assist a professor, that's not exactly
5 a precise statement. I mean, one may assist here, one may
6 assist. One may assist in large part.

7 MR. PAGE: Dr. Engel told Dr. Ji-Hong how he wanted
8 to do the allocation. And Dr. Engel -- Dr. Ji-Hong followed
9 Dr. J-iHong's -- excuse me. Dr. Ji-Hong followed Dr. Engel's
10 analysis, and then Dr. Engel checked the analysis. Now during
11 the deposition --

12 THE COURT: What concerns me, though, in the
13 deposition, when asked exactly how they got there -- or Ji-Hong
14 got there, Dr. Engel said, I'm not certain. I don't want to
15 speculate. Once again, it looks like it was something that
16 wasn't fully addressed.

17 So it raises the question how much input Engel had
18 and how much of this was actually delegated to Ji-Hong.

19 MR. PAGE: Your Honor, I think you can take -- in the
20 two-day deposition of an expert, you do a lot of complex work.
21 We can all cite many instances where the expert will say, you
22 know, I don't want to speculate, I'll have to go back and look
23 at that.

24 Oftentimes during this actual deposition where
25 Dr. Bierman attended, Dr. Engel will take Dr. Bierman's

1 computer and show him from the files how he got the results.

2 So a long, two-day opinion, I think, is unfair to
3 characterize Dr. Engel's lack of supervision because he
4 couldn't recall specifically in the middle of the second day,
5 or whenever it was, exactly how that allocation worked.

6 But one thing is true in this case, Your Honor:
7 Every time the defendants have asked, trying to understand how
8 this model worked, we have provided them their information.

9 In fact, even before the depositions, Your Honor,
10 they were having difficulty working the model, so we set up
11 conference calls with counsel listening, so Dr. Bierman could
12 talk directly with Dr. Engel.

13 It was during those conference calls where Dr. Engel
14 was trying to explain how the model worked, where he discovered
15 that some of the HRUs, part of the errata, were missing, that
16 we didn't have a complete set of HRUs. So it was during that
17 call when Dr. Engel was trying to explain that was -- to
18 Dr. Bierman -- it's where he identified the problem for
19 Dr. Bierman and said, that's why you can't get the answer, I'll
20 have to look at those HRUs for you and get some new data on
21 that.

22 So that was all subject to errata, Your Honor, which
23 this Court is well aware doesn't weaken the report; it just
24 strengthens the report.

25 So, Dr. Engel clearly understands how to do these

1 allocations. And I think it's very persuasive that Dr. Storm
2 agrees, as we pointed out in the deposition, that these
3 methodologies that he employed are appropriate and that they're
4 the same methodologies that are employed by other watershed
5 modelers in cases involving major watersheds.

6 In fact, some of the allocation methods that were
7 looked at by Dr. Engel and the sources are the same sources and
8 allocation methods that other modelers have used actually in
9 this watershed in published papers. And Dr. Engel identifies
10 in his declaration other modelers and investigators of the IRW
11 who have identified less sources than he actually identified in
12 this particular watershed for phosphorus allocation.

13 So, Your Honor, I think just to sum this up, I think
14 that what we have here is the best man that's acknowledged by
15 this Court as an expert in watershed modeling and the watershed
16 that's just north of this watershed, Eucha/Spavinaw . He is
17 clearly the best man. And as far as I can tell, in the
18 country, he is probably the best watershed modeler in the
19 country.

20 THE COURT: How many acres in the Eucha/Spavinaw as
21 opposed to the million acres here?

22 MR. PAGE: I think it's about a third. It's about a
23 third. But the land uses, except for some populations -- the
24 land uses and the geology, the topography is very similar. And
25 certainly the poultry practices in the pasture is very

1 similar. There's not row crops there. It's the same type of
2 watershed.

3 THE COURT: Except no urban applications in that
4 watershed.

5 MR. PAGE: Very -- less, less. But Dr. Engel gave --

6 THE COURT: Spavinaw isn't exactly a booming
7 metropolis, right?

8 MR. PAGE: That's correct. But Dr. Engel gave a huge
9 benefit on urban applications because he assumed that all the
10 wastewater treatment plant phosphorus gets immediately to the
11 lake. That was immediately allocated. And he has published
12 many papers on urban runoff. So when he characterized how to
13 use GLEAMS for urban runoff, he has published using the same
14 model of GLEAMS for urban runoff applications in other
15 watersheds. He's published his work in that area. He's an
16 expert on urban runoff modeling and evaluation.

17 So, Your Honor, I think we have the best model. We
18 have a well-established model that's based on a long-
19 established predicted model of GLEAMS along with the routing,
20 how fast is the phosphorus getting from the fields to the lake
21 based on observed data. That becomes the equation. That
22 becomes the mathematical ratio for how much phosphorous how
23 fast is getting into the lake. It's observed data.

24 We have very good scientific support, Your Honor.
25 The defendants cannot point to any other published literature

1 or any other expert that suggests that the allocation and the
2 methodology employed by Dr. Engel in his computer model is
3 faulty. There's application after application, study after
4 study corroborating the results of the computer model.

5 Now, on the other hand, I think we have lawyer
6 argument and an inexperienced watershed modeler making
7 arguments.

8 And, Your Honor, although I know the defendants do
9 not have to put on their own model, if they're going to
10 criticize the scientific assumption made by Dr. Engel, they
11 must have a scientific basis for that.

12 And when I was trying to make my point with the lack
13 of model -- and not very articulately, Your Honor -- is that
14 these issues such as there should have been a sensitivity
15 analysis. Well, if they're running the model and they're
16 capable of running the model, why didn't they just run Engel's
17 model, change one of the inputs and show that that makes a big
18 difference. It was simple. They didn't have to run their own
19 model. They could have done the sensitivity analysis on
20 Engel's model.

21 Or if they felt that the model of Dr. Engel should
22 have been properly calibrated based on edge-of-field data, they
23 could have taken that data and recalibrated the model based on
24 edge-of-field data and see if it made a difference. There is
25 no such information provided by the defendants in this case.

1 So if you're going to make a scientific criticism,
2 you must have a scientific basis for that criticism. And that
3 was my concern that I was trying to raise there, Your Honor.

4 So in summary, the State respectfully requests that
5 the Court deny the defendants' motion for Daubert on
6 Dr. Engel's computer model.

7 THE COURT: Thank you very much. And anything else
8 with regard to Bierman?

9 MR. PAGE: I can go quickly into Bierman, if you
10 would like, Your Honor.

11 THE COURT: I think we need to do this all at once,
12 so go ahead.

13 MR. PAGE: My colleagues wanted me to make one other
14 point that I've forgotten in my rush to try to move things
15 along, Your Honor. Before lunch, you had asked about records
16 and authority for amount of waste that had been moved in and
17 outside the watershed. Part of Dr. Engel's report and
18 Dr. Fisher's original report, they did a study of waste
19 management practices using the records from the Oklahoma
20 Department of Agriculture.

21 And with those records, they were able -- of course,
22 not all land application is recorded, but the records they did
23 have for land application recorded, they were able to discern
24 how much waste is being shipped in and out. And their
25 opinions, both Engel and Fisher, is that about the same amount

1 of waste being shipped out is being shipped in each year.
2 That's part of the original expert reports of both of those
3 experts, sir.

4 So there was a scientific basis and analysis that
5 supported that assumption, and I was neglectful for not
6 pointing that out to the Court earlier.

7 THE COURT: Thank you. Mr. Bierman.

8 MR. PAGE: Your Honor, I've talked about Mr. Bierman
9 already. And we have two bases for exclusion. One is that he
10 is not -- he is not a watershed modeler, so his opinions on
11 watershed modeling are not valid because he does not have
12 expertise in the area that is at issue.

13 And, Your Honor, in the Wheeling case,
14 W-H-E-E-L-I-N-G, 254 F.3d 1342, the question the court points
15 out is what is the area in which the expert is an expert about.

16 He doesn't -- it's not sufficient that the expert is
17 an expert in matters in general, but he has to be a specific
18 expert in the areas in which he's given an opinion.

19 And here, he's given an opinion, his only opinion,
20 his attack opinion on Dr. Engel's watershed modeling.

21 Also, Your Honor, I'll refer the Court to the case in
22 our brief In Re: Williams Securities litigation, 596 F. Supp.
23 2d 1195 which stands for the same proposition.

24 He does not have experience on watershed modeling.
25 He's never worked with GLEAMS. He's not published in the

1 area. He's not published anything in the area of watershed
2 modeling. He's not part of the American Society of
3 Agricultural and Biological Engineers. He's not a
4 hydrologist. He has no experience with land use/land cover
5 data. His opinions on that, that somehow the land use was
6 mischaracterized for GLEAMS, are based on subordinates in his
7 office. But it wasn't a matter of supervision; he just has
8 never worked with this data. He's relying on their opinions
9 solely. He does not independently have a basis to interpret
10 land use, land cover data.

11 Now -- so, Your Honor, I think all of that in and of
12 itself in the first prong of the Daubert analysis shows that
13 Dr. Bierman is not an expert in watershed modeling and cannot
14 offer an opinion on section 10 of Dr. Engel's report.

15 The next question is, then, well, is his opinion
16 relevant?

17 THE COURT: Before you go into that, it's represented
18 here that he has 35 years of experience working with routing
19 models such as the one developed by Engel, and that he has
20 experience in the evaluation of runoff modeling. Do you
21 contest that?

22 MR. PAGE: Yes. He does understand channel or
23 instream modeling. He has done that. In here, we've used
24 empirical data for the coefficients, so it's not a lot of
25 complexity because we're using real data, but he has no

1 experience, Your Honor, in field runoff modeling.

2 His work -- I mentioned this, I believe, briefly this
3 morning, not very clearly. His work, when he's been involved,
4 has been involved in a team effort. For example, he worked on
5 a matter in the South Florida Water Management District
6 concerning impacts on the Everglades.

7 He worked personally on the Everglade or in the
8 water, the lake or the Glades modeling. But for the runoff
9 coefficient and that information, he got from the South Florida
10 Water Management District and their particular experts.

11 So he's been involved with projects where people have
12 done field runoffs, but he's never personally done it himself.
13 Other people, other experts were involved contributing that
14 expertise to the evaluation and not Dr. Bierman. And he admits
15 that he's never personally done that type of modeling. He's
16 only been involved in teams where others have personally done
17 that modeling.

18 That is the runoff component, Your Honor. That's the
19 GLEAMS component.

20 Now, with regard to his opinions and whether they're
21 relevant, this goes to the issue that we just discussed about
22 whether or not he has any scientific basis, then, for his
23 specific criticisms. Did he cite a peer-reviewed scientific
24 journal article that says you need to calibrate to the edge of
25 field in the GLEAMS model? Or did he cite to a peer-reviewed

1 article that says, you know, in this situation when you have an
2 experienced modeler who's used the model a lot, do you always
3 have to do a sensitivity analysis when you have empirical data
4 for your inputs or the other data is known?

5 He doesn't cite any papers like that, nor did he do
6 any tests to demonstrate that his criticisms actually would
7 have an impact. Again, if it was important to do these type of
8 calibrations or the sensitivity analysis, he could have said,
9 you know, and I did it, and we got a different result;
10 therefore, it was important.

11 When I asked him in his deposition why didn't he test
12 it, his response was, I don't have to do Dr. Engel's model for
13 him, that's his job. But I pressed him. I said, how do you
14 know that it would make a difference. He said, well, my 35
15 years of experience, I just believe it would.

16 Well, Your Honor, I think his expertise is not
17 sufficient to support his generalized claims, and he could have
18 alleviated the issue very simply by doing a test, by testing
19 this issue. But he did not. He did no model of the IRW. He
20 did no analysis of the sources, so his claims that Dr. Engel
21 didn't consider all the sources, how does he know? He hasn't
22 done an analysis of sources.

23 He did no analysis of historical loads to the lake.
24 He's done no analysis of future loads to the lake. He did no
25 testing of his criticisms whatsoever; for example, his

1 sensitivity analysis criticism.

2 In summary, Your Honor, I think that because these
3 criticisms are engendered by no scientific report and by
4 arguments created by counsel, they should not be given any
5 weight by this Court.

6 We're criticizing a scientific project. We need
7 scientific criticism, and it's just not present here by
8 Dr. Bierman.

9 THE COURT: Thank you, Mr. Page.

10 Mr. George.

11 MR. GEORGE: Thank you, Your Honor, and I believe I
12 can be pretty brief. If the Court is amenable to my proposal,
13 I'll start with the reply on Engel, and then move directly into
14 Dr. Bierman. And, Your Honor, out of respect the Court's time
15 and my own energy level, I'm not going to chase everything that
16 Mr. Page said, but there were a few things with respect to his
17 attempt to defend Dr. Engel that I want to respond to because I
18 think there may be some misunderstandings.

19 First of all, Your Honor, we heard some pretty
20 frequent resorts to the City of Tulsa case in Eucha/Spavinaw to
21 sort of validate the methodology. We heard frequent references
22 by Mr. Page to Dr. Daniel Storm at Oklahoma State University,
23 and we also heard reference to an individual by the name of
24 Dr. Chauby. I'd like to provide just a little color, not a
25 lot, around those individuals and how they connect to these

1 issues because they are relevant.

2 Your Honor, one point that was not mentioned by
3 Mr. Page is that the Eucha/Spavinaw case which, of course, was
4 presided over by Judge Eagan, involved a Daubert motion similar
5 to this one in which a model similar to Dr. Engel's, although
6 certainly not identical -- it was a watershed model, not an
7 edge-of-field model -- was put forward and rejected by the
8 court as unreliable.

9 And in particular, Your Honor, the opinion that was
10 rejected was that the Court found that the model was not
11 sufficiently reliable to allocate back sources.

12 And so Dr. Storm, who was the witness in that case by
13 the City of Tulsa, came forward with opinions, much like the
14 opinions we've heard from Dr. Engel about percentage relative
15 contribution at a watershed scale over time. And the Court
16 evaluated some of the same considerations that have been
17 presented to Your Honor today and invited Dr. Engel to provide
18 some counsel as to his own views of those issues and
19 reliability of the work, and the Court excluded that.

20 And I say all of that, Your Honor, simply to point
21 out two things: One, there's some precedent in this court for
22 the need to be careful about, predictions from models at a
23 watershed scale, even in a smaller watershed.

24 Secondly, Your Honor, Mr. Page has said repeatedly in
25 his argument that the allocation method employed by Dr. Engel

1 in this case is identical to that employed by Dr. Storm. Well,
2 that allocation method has already been rejected and found to
3 be unreliable.

4 THE COURT: I don't think that's precisely what he
5 said.

6 MR. GEORGE: That's the way I understood his remarks,
7 Your Honor. And, Your Honor, there were frequent references to
8 the deposition testimony of Dr. Storm where Mr. Page went
9 through and on maybe one instance cited a page, but generally
10 made representations to the Court that Dr. Storm agreed with
11 certain things Dr. Engel has done. And I would just ask the
12 Court to consider the record that's before it. I was at the
13 deposition. I've reread the deposition transcript, and I don't
14 believe Dr. Storm has conducted a peer review of Dr. Engel's
15 work. I don't believe he has vouched for-- either in that
16 deposition or any other setting -- the opinions, methods or
17 processes of Dr. Engel in this case.

18 And so I think there needs to be some care exercised
19 as to exactly what Dr. Storm's view is, and I think the
20 deposition transcript will bear that out most directly.

21 Now, Dr. Chauby was mentioned as someone who has --
22 was deposed in this case, is a scientist that was previously
23 with the University of Arkansas, and I believe Mr. Page
24 represented that he agreed with Dr. Engel's methods -- modeling
25 methods in this case. That deposition is also in the record on

1 this motion or at least portions of it that the parties
2 believed were relevant.

3 Dr. Chauby has not reviewed Dr. Engel's work in this
4 case. He is a member of the department that Dr. Engel presides
5 over at Purdue University and, in fact, reports directly to
6 Dr. Engel. He was deposed in this case because he had issued
7 some reports while he was on tenure at the U of A and was asked
8 some questions about those. So once again, I don't believe
9 that Dr. Chauby is a corroborating witness, if you will, for
10 the methodology. I don't think that's a fair reading of the
11 deposition testimony.

12 The last person in the story that I want to draw
13 attention to, Your Honor, is Dr. Ji-Hong. And there was some
14 discussion about that. And the Court asked an intuitive
15 question, and that was: Has anyone bothered to depose
16 Dr. Ji-Hong? And, Your Honor, if you'll read what -- this is
17 cited in the motions, but if you'll thumb back through the
18 deposition of Dr. Engel, you'll see that we asked him
19 frequently for contact information on the record in that
20 information for Dr. Ji-Hong after it became apparent that many
21 of the questions, particularly around the allocation, we were
22 not making headway in terms of getting answers, and we were met
23 consistently both by representations from counsel and by
24 Dr. Engel with no cooperation. They refused to provide the
25 contact information. Said at one point they'd look for it on a

1 break. Came back, said they didn't have time to look for it.

2 We asked on the record what the State's position was
3 as to whether we could take his deposition if we could find
4 him. I think he's in South Korea now. State refused to take a
5 position as to whether he was a consultant or testifying
6 expert.

7 Long story short, I wanted Your Honor to know that
8 the defendants put forth some effort. We wanted to talk to
9 Dr. Ji-Hong to find out exactly what was done behind the scenes
10 on some of these things, and those efforts were thwarted.

11 Cattle. There was some discussion by Mr. Page of
12 cattle. And I believe he represented that Dr. Storm agreed
13 with the approach by Dr. Engel in this case that cattle are
14 recyclers and, therefore, you don't have to model them.

15 Well, if you look, Your Honor, at Exhibit 8 and
16 Exhibit 9 to the motion, it is the TMDL report that has been
17 mentioned a time or two by Dr. Storm using a different model on
18 this watershed; and he, in fact, modeled cattle. There may be
19 some language in his deposition testimony they like about
20 whether cattle can take up phosphorus, but the reality is when
21 Dr. Engel set out to do his own -- I'm sorry, when Dr. Storm
22 set out to do his own scientific analysis of the sources in
23 this watershed using a watershed scale model, he modeled
24 cattle. And he came to the conclusion that cattle contributed
25 21 percent of the phosphorus at Lake Tenkiller on an annual

1 basis.

2 So the idea that Dr. Storm has somehow validated
3 Dr. Engel's neglect of cattle as a source in terms of modeling
4 is simply not borne out by his own work in the report that is
5 issued and that's in the record.

6 There was a reference to calibration. Mr. Page made
7 the statement that this model had been tested because it had
8 been calibrated, and he described the process as very careful
9 and very precise; that you look at data and then you make very
10 careful and precise adjustments.

11 Your Honor, this is maybe a level of detail that's
12 not necessary, but just so there's no confusion, I want it in
13 the record, and it is in the record on motion, that the
14 calibration in this case was not done by someone exercising
15 their professional judgment, having reviewed the physical
16 characteristics of the watershed and decided, well, you know,
17 maybe we've got a little too much soil test phosphorus, and I'm
18 going to look at data and I'm going to turn it down. That's
19 not what the calibration involved.

20 The calibration by Dr. Ji-Hong in this case was done
21 by a computer program that he wrote. And what he told the
22 computer program to do is you can take any variable, whether
23 it's poultry litter, it's soil test phosphorus, it is rainfall,
24 any variable that has an impact, and the computer can turn it
25 50 percent up or 50 percent down and the computer is going to

1 do all of those different machinations, and whatever results in
2 the best fit, that's where we're going to leave those values.

3 So it is arbitrary. And that was a characterization
4 the defendants gave it, and it's because that's exactly what
5 occurred.

6 There was a discussion or a reference by Mr. Page to
7 Dr. Engel's testimony in the City of Tulsa case before Judge
8 Eagan where he provided a criticism or a review of the model in
9 that case. And the transcript from that testimony or hearing
10 is attached, and I believe it is -- I believe it's Exhibit 10,
11 but if I'm wrong, I'll try to correct that, Your Honor.

12 I simply want to point the Court to it because the
13 reality is -- and this is described in the papers -- Dr. Engel
14 didn't even follow or adhere to his own criticisms of Dr. Storm
15 in his work in this case. He did criticize Dr. Storm for not
16 doing sensitivity analysis in that particular model and then
17 proceeded in this case to ignore that same step as well. There
18 are many other examples of places where he has parted from his
19 own direction.

20 Last point I want to make, Your Honor, is with regard
21 to the routing model. And I think the Court has been correct
22 to sort of focus some of its questions and inquiry on that
23 piece because it's a problematic piece.

24 Mr. Page has referenced the Court to various
25 paragraphs of the declaration, supplemental declaration that

1 has been stricken by the Court, but the Court has kept track of
2 what's been referenced, and so I simply want to comment,
3 Your Honor.

4 If you'll look at carefully at those -- or closely,
5 rather, at those paragraphs, what you'll see is Dr. Engel
6 simply saying others in the watershed community have used
7 routing models.

8 What he doesn't say, and what is the relevant inquiry
9 in this case is, there's someone else out there in the peer-
10 reviewed scientific community who has used the routing model
11 that's listed out in footnote 3 of our motion, which is an
12 express equation that is important to his modeling work in this
13 case. He doesn't say that. We asked him in his deposition if
14 anyone else had ever used it, and he could not identify one.

15 So, Your Honor, with that, unless you have questions
16 on Dr. Engel, I'll move quickly to Dr. Bierman.

17 THE COURT: Go ahead.

18 MR. GEORGE: And I won't belabor the point,
19 Your Honor. Dr. Bierman does have 35 years of experience
20 working on a host of different environmental models, routing
21 models being one of particular emphasis in his work, but not
22 the sole emphasis. He's worked a lot on receiving water
23 models. He has worked, contrary to the representations -- or
24 characterization by Mr. Page, he's worked on runoff models and
25 watershed models.

1 And perhaps the best way for the Court to get a sense
2 as to Dr. Engel's relevant experience -- I'm sorry,
3 Dr. Bierman, is to simply look at pages 64 through 84 of his
4 deposition.

5 And I read through these again last night. Mr. Page
6 was asking Dr. Bierman about his relevant expertise on
7 watershed modeling and particular instances in which he had
8 been asked to review watershed modeling work. And here is just
9 a flavor of the things that he mentioned.

10 He was selected by the Florida Environmental
11 Protection Agency to peer review a watershed model that
12 included runoff component models for TMDLs on the -- I have a
13 hard time with the name -- Caloosahatchee, I think, River in
14 Florida. He was selected as the EPA peer reviewer for the HSPF
15 model, which is a model that's been applied to this watershed
16 by a government agency that has obviously runoff components to
17 it, and that model was used by EPA to set the numeric criteria
18 for nutrients for several Minnesota watersheds.

19 Dr. Engel has, for over 20 years, been involved for
20 several different clients in reviewing and commenting on the
21 watershed model for the Chesapeake Bay, it's an area of great
22 interest for watershed modelers.

23 He has just recently been asked to sit on an EPA
24 advisory panel to look at developing nutrient criteria for
25 watersheds nationwide.

1 So the idea that Dr. Bierman has had no experience in
2 reviewing watershed models and commenting on their integrity
3 and validity scientifically is simply not borne out by the
4 record.

5 THE COURT: Is his Chesapeake Bay work connected with
6 the Delmarva poultry operation?

7 MR. GEORGE: Certainly some of the sources and issues
8 that are being studied in that watershed relate to poultry.
9 It's a very complex watershed. There is far more going on
10 there than just poultry litter.

11 THE COURT: A lot of geese, as I recall.

12 MR. GEORGE: There are a lot of geese, Your Honor.
13 It's an estuary, so it's got a unique system to it as well. So
14 there's a lot in play in that watershed, but it's certainly
15 relevant.

16 The irony, Your Honor, of the idea that Dr. Bierman
17 is not qualified to review and comment on Dr. Engel's work and
18 mistakes that he's made is palpable, given that we have two
19 errata in this case from Dr. Engel; both of those errata are
20 the product of mistakes pointed out by Dr. Bierman after
21 reviewing his work.

22 And so I find it a little disingenuous -- I want to
23 be careful; that may be too strong a term. I find it a little
24 less than persuasive that his credentials to review this work
25 is being challenged given his demonstrated ability already and

1 acknowledgements by Dr. Engel by correcting mistakes that were
2 pointed out.

3 The criticisms that are made that Dr. Bierman did not
4 test his work or -- test some of his criticisms are just not
5 true. We've talked at length about some of the tests that
6 Dr. Bierman performed, particularly on the routing model, and
7 some of the sensitivity analysis that he performed.

8 Your Honor is absolutely correct that the defendants
9 don't have to put forward a model. We don't have that legal
10 obligation to put forward a model that describes, you know, the
11 universe as we see it; and so Dr. Bierman was not asked to do
12 so, and that's the reason and the only reason why you don't
13 have that sort of analysis in front of you.

14 The last thing, Your Honor, with respect to
15 Dr. Bierman, I just want to make sure we understand the scope
16 of the challenge, because Dr. Bierman's report includes comment
17 on more than just the GLEAMS runoff model. He comments on the
18 routing model. And I don't -- I've not seen anything to
19 suggest that his expertise in that area has been challenged.

20 He comments on a lake model that was done by another
21 expert in this case, Dr. Wells. And I've seen no motion filed
22 with respect to his ability and qualifications to comment on
23 that model.

24 And so, Your Honor, I just wanted to simply frame
25 that before I stepped down. That's all I have in terms of

1 Dr. Bierman. Obviously, Your Honor, if there are questions I
2 can answer about Dr. Bierman, I would like to. Thank you, Your
3 Honor.

4 THE COURT: Mr. Page, any reply?

5 MR. PAGE: Just briefly, Your Honor. Your Honor, I
6 also welcome careful review of the deposition transcript we've
7 applied and attached to our motion on Dr. Bierman.

8 Your Honor, the distinction is --

9 THE COURT: When am I going to have time to do that?

10 MR. PAGE: Yeah. Let me make the distinction. It's
11 one thing to sit on a panel as a group and review a model for,
12 let's say, the Chesapeake, which wants to determine where the
13 phosphorus is coming from that's going to the Chesapeake and
14 what's happening to the phosphorus once it gets into the
15 Chesapeake.

16 Dr. Bierman understands what's happening to
17 phosphorus once it gets in the Chesapeake; that's why we don't
18 challenge his criticism on Dr. Wells in the lake.

19 He does not understand and has never done and has
20 never published an article on how the phosphorus runs off the
21 fields, the nonpoint source part. And that's the point. And
22 that is a significant component of Dr. Engel's computer model.

23 Just because you've done nutrient criteria, that is
24 not modeling, Your Honor. The only test that Dr. Bierman
25 performed to support his opinion was put 72 million people in

1 the watershed.

2 And I hope I've explained to the Court that once
3 Dr. Engel put together the model that used the instream data so
4 he knew what loss or delay the phosphorus was going to occur in
5 the watershed, then you run the model. When they added the 72
6 million people, they didn't just run the model, they maintained
7 field --

8 THE COURT: I understand. You've made your point
9 there.

10 MR. PAGE: -- so that test is not valid. So,
11 Your Honor, those are the only points I've got. I just have a
12 short test -- in the next day and a half, you're going to hear
13 criticism by the defendants that we have not -- or some of our
14 experts have not done a traditional fate and transport
15 analysis.

16 THE COURT: I've read that a few times.

17 MR. PAGE: You've read that a few times. You know,
18 Your Honor, I'm not sure exactly what a traditional fate and
19 transport analysis is. And it clearly would be something
20 different, depending on the contaminants and the particular
21 circumstances, but if you talk to people about chemicals, often
22 a traditional fate and transport analysis is section 10 of
23 Dr. Engel's report. It's a computer model that understands
24 what happens to phosphorus or nutrients on fields and how it
25 runs off, and how much is observed, and how much goes through

1 the subsurface.

2 And that is Dr. Engel's, section 10 of his report is
3 as much of a traditional fate and transport analysis as you'll
4 see in this case with regard to phosphorus. Thank you.

5 THE COURT: Thank you very much. Because the law
6 requires findings and conclusions, we'll take a brief recess
7 and be back.

8 (Recess was had.)

9 THE COURT: With regard to the Dr. Bierman Daubert
10 motion 2063, the State has challenged Dr. Bierman's opinion
11 based both upon his qualifications to testify and the
12 reliability of his opinion.

13 The State contends Dr. Bierman is not qualified to
14 offer an opinion regarding Dr. Engel's watershed modeling work;
15 that Dr. Bierman has no experience in runoff modeling, has no
16 peer-reviewed publications in runoff modeling and is not an
17 expert in watershed hydrology.

18 The record, including Dr. Bierman's CV information in
19 his report, established that Dr. Bierman is a Ph.D. in
20 environmental engineering. Although not a hydrologist, he has
21 experience in hydrology. He has spent his entire 35-year
22 career working with routing models. He has experience in
23 runoff modeling. He has more than 30 years of experience in
24 working with mass balance models. And this Court's
25 understanding is that GLEAMS is a mass balance model.

1 The Court concludes, based upon his review of
2 Dr. Bierman's education and experience, that he is qualified to
3 opine regarding Dr. Engel's modeling report. The State will be
4 entitled to cross-examination of Dr. Bierman concerning his
5 qualifications in order to challenge his credibility.

6 The State has challenged the reliability of
7 Dr. Bierman's opinions based upon alleged deficiencies in his
8 methodology. Regarding the State's first criticism, that
9 Dr. Bierman failed to test his criticisms of Dr. Engel's IRW
10 modeling and did not cite peer-reviewed literature to support
11 his claims, a review of Dr. Bierman's report shows that in
12 connection with his opinion that Dr. Engel did not follow his
13 own published guidance on procedures for standard application
14 of hydrologic/water quality models, Dr. Bierman cited a peer-
15 reviewed article titled "A Hydrologic Water Quality Model
16 Application Protocol," authored by Dr. Engel and others, found
17 at number 2056, page 21.

18 Regarding whether Dr. Bierman conducted work to test
19 if his criticisms of Engel's work made any material difference
20 in the modeling outcome, a review of Dr. Bierman's expert
21 report at number 2056 discloses that Bierman ran a number of
22 different tests to demonstrate the alleged lack of utility or
23 reliability of Dr. Engel's model.

24 We've discussed this quite a bit today. And although
25 the State critiques the way in which Dr. Bierman ran the model,

1 and it would appear that the State has the stronger of the
2 arguments in this case, will allow Dr. Bierman to testify and
3 be cross-examined in that regard.

4 Finally, with regard to the State's allegation
5 regarding land use and land cover, Dr. Bierman relied upon
6 other experts' interpretation of aerial photos to make land use
7 determinations. Under Rule 703 of the Federal Rules of
8 Evidence, the Court finds that this is a permissible basis upon
9 which Dr. Bierman can base his opinions on land use.

10 The Court concludes, based upon what has been
11 provided to it in the record, that Dr. Bierman's opinion meets
12 the requirements of Daubert regarding reliability of his
13 methodology. The State will have an opportunity to impeach
14 Dr. Bierman's methodology on cross-examination at trial.

15 Having found that Dr. Bierman is qualified to testify
16 on the matters set forth in his report, and that his
17 methodology passes the Daubert test for reliability, the Court
18 hereby denies the State's motion to exclude expert testimony of
19 Dr. Bierman, number 2063.

20 With regard to Dr. Engel. I am -- as yet -- am still
21 concerned about the way in which Dr. Engel reached his
22 allocations here, similar to the concern that Judge Eagan had
23 in the Eucha/Spavinaw matter. But as I understand the law, a
24 trial court has discretion to conduct the reliability and
25 helpfulness analysis that Daubert and Rule 702 require in the

1 context of a summary judgment motion and, if necessary, to
2 conduct that at trial and to exclude expert testimony found
3 wanting from its consideration in ruling on the motion for
4 summary judgment and/or at trial.

5 The Court, because of the questions that are still in
6 play here with regard to the way in which Dr. Engel reached
7 those allocations -- I understand the model itself, but the --
8 reaching the allocations appear to be -- not to have been an
9 output of this base model, and we'll take a closer look at it.

10 The motion for exclusion of Dr. Engel's testimony,
11 number 2056, is denied insofar as the Court will continue to
12 conduct its reliability and helpfulness analysis that Daubert
13 and Rule 702 require in the context of further proceedings.

14 Let's move on to the next set of motions. And that,
15 as I understand, would be Dr. Harwood, motion number 2028,
16 motion number 2090, and motion number 2072. Are there any
17 others that pertain to Harwood?

18 MR. TODD: I don't believe so, Your Honor.

19 THE COURT: And Mr. Todd, I think you -- it will be
20 safe to assume that I'm more familiar with the Harwood report
21 than I was with this last, so you may proceed with that
22 understanding.

23 MR. TODD: Thank you, Your Honor. I have structured
24 my remarks with that assumption in place. Of all the experts,
25 of all the motions you're going to hear today and tomorrow, I

1 assume you're most familiar with this one and with the motion
2 as to Dr. Olsen's testimony, the State's source-tracking
3 experts. You heard their testimony at the preliminary
4 injunction proceeding. You've read their reports. You've
5 heard from defendants' experts, our responding to them. You've
6 previously found Dr. Harwood and Dr. Olsen, their source-
7 tracking methodologies to be unreliable under Daubert, a ruling
8 the Tenth Circuit affirmed.

9 And the State is now back here looking to extract or
10 elicit essentially the same testimony, the same methodologies
11 from both witnesses at trial. And defendants would
12 respectfully suggest the same outcome should obtain here.

13 Rather than rehash the arguments and the testimony,
14 the evidence Your Honor has heard before, I thought the must
15 useful way to proceed would be to focus on the things that are
16 actually new and hone in on where Dr. Harwood's methodology
17 stands today.

18 With regard to Dr. Harwood, as Your Honor will
19 recall, she purports to have identified what she called a
20 biomarker, a strand of DNA that is specific to a previously
21 unidentified type of bacterium which is itself unique to
22 turkeys and to chicken poultry.

23 Dr. Harwood's biomarker theory is essentially
24 unchanged from the preliminary injunction proceeding. And we
25 throw up some of her deposition testimony here on the screen

1 for Your Honor. We took her deposition in July of 2008 after
2 she served her report and after she testified at the PI
3 hearing.

4 And as Your Honor can see, one of the first things we
5 did was asked her: What have you done that is new? And she
6 told us that since the PI hearing, and since her deposition
7 before the PI hearing, she had not studied any of the
8 characteristics of bacterial fate in the Illinois River
9 Watershed with regard to any of the attributes or any of the
10 things that might kill bacteria: Temperature, desiccation,
11 predation, osmotic pressure, UV exposure, pH balance.

12 THE COURT: To the extent that both sides here appear
13 to agree that whether or not this brevibacterium is alive or
14 dead, this poultry-specific biomarker or, in this case, avian-
15 specific biomarker, whatever it is, or bacteria-specific
16 biomarker -- I guess it's a biomarker from the brevibacteria,
17 right?

18 MR. TODD: That's right. The biomarker is actually
19 the 500-some-odd base pair strand of DNA, but it's carried by
20 bacterium.

21 THE COURT: Right.

22 MR. TODD: So if Your Honor's question is going to
23 the why does it matter how the bacteria moves...

24 THE COURT: No.

25 MR. TODD: Sorry.

1 THE COURT: My understanding is, does it really
2 matter whether it's alive or dead. We had lots of testimony
3 regarding ultraviolet radiation exposure, etcetera, whether or
4 not the -- it would remain alive. Of course, that was really
5 focused on the E. coli and some of the pathogenic bacteria.

6 This is not pathogenic.

7 MR. TODD: Correct.

8 THE COURT: So everyone seems to agree that this
9 brevibacterium and this biomarker remains in the water after
10 it's dead. So it really doesn't matter, does it that it -- I
11 know you've made the argument that, well, because it lasts so
12 long in the water, we need to make sure that it is poultry-
13 specific as opposed to the result of geese, etcetera, because
14 to the extent that it lasts longer in the water, obviously, it
15 will reflect wherever it comes from, correct?

16 MR. TODD: It does matter that it's carried by a
17 bacterium. And the bacteria's ability to persist in the
18 environment does matter for this reason: The biomarker --
19 Dr. Harwood's theory, her whole testimony here assumes that --
20 she uses the biomarker as an indicator. She says where we find
21 the biomarker and we see fecal indicator bacteria nearby, that
22 proves that those must have come from chickens or from turkeys.

23 THE COURT: Well, but you'll agree that she found
24 vast amounts of this bacterium in poultry litter, correct?

25 MR. TODD: She did find -- well, the --

1 THE COURT: It was like a half a billion of these
2 things in a very small area, correct?

3 MR. TODD: The measurements varied from sample to
4 sample, in some there was a tremendous amount and in some there
5 was very little, which actually raises other questions as to
6 its reliability. But I don't want to get Your Honor off track
7 of where you are now.

8 THE COURT: I don't know if you authored the brief or
9 Mr. Jorgensen, but it opened my eyes to some extent. You say
10 it is clear in the published data that this particular
11 bacterium has been spotted before in rice hulls, which is a
12 component of poultry litter, correct?

13 MR. TODD: Yes.

14 THE COURT: And decayed wood, correct?

15 MR. TODD: Yes.

16 THE COURT: And of course, the theory, as I
17 understand it, then, is that because this is all part of the
18 poultry litter that is spread out, ergo, when you find this
19 indicator bacterium, you're going to find poultry manure. Of
20 course, I understand your fate and transport arguments, that
21 just because they're here together at the point in time they're
22 spread doesn't mean that because of size, shape, etcetera, a
23 multitude of factors, they don't move differently in the
24 watershed, correct?

25 MR. TODD: Right. And it may be coming from there.

1 It may be coming from rice hulls or decayed wood or elsewhere.
2 The fact is that you do not know. The fact that you find the
3 DNA strand in the environment doesn't mean that any fecal
4 indicator bacteria nearby necessarily came from chickens as
5 opposed to cows or any other warm-blooded mammal in the
6 environment.

7 THE COURT: Is it clear in this record that one can
8 obtain identical strands of DNA from different bacteria in the
9 water?

10 MR. TODD: I don't know that that -- that there's
11 record testimony on that point. If you -- there's only but so
12 many nucleic acids that form DNA. I want to say it's four. So
13 if you cut it down enough, you're going to find the same
14 isolatable strand in different bacteria. That goes to one of
15 the problems with Dr. Harwood's testimony --

16 THE COURT: Identical to this strand?

17 MR. TODD: Not -- well -- identical to this strand --

18 THE COURT: There's nothing in this record to
19 indicate the likelihood of that, is there?

20 MR. TODD: I don't know that that's been isolated,
21 Your Honor, but we certainly have isolated the same bacterium
22 and the same DNA strand from multiple sources, not just from
23 poultry.

24 THE COURT: Correct. Dr. Myoda did.

25 MR. TODD: Correct, Your Honor.

1 THE COURT: Go ahead.

2 MR. TODD: So the reason -- the reason that the fate
3 matters -- I guess Your Honor understands this -- is because if
4 the biomarker and the fecal indicator bacteria from chickens
5 aren't moving together, then when you find them together at the
6 end of the process, there's no guarantee that they came from
7 the same place. So that's why we asked Dr. Harwood these
8 questions, to confirm whether she had done any additional work;
9 and she confirmed for us that she hadn't looked at fate
10 issues.

11 She hadn't looked at transport issues with regard to
12 this or any other bacterium in the IRW.

13 She hadn't cultured -- hasn't cultured the
14 *brevibacterium* that she had identified that appears to carry
15 the biomarker that she's concerned about.

16 And because she hasn't cultured it, she hasn't
17 studied its fate and transport characteristics. So there's no
18 guarantee that it moves at the same speed or persists in the
19 environment at the same -- with the same ability as the fecal
20 indicator bacteria that it's being used to identify.

21 She also had not studied any additional -- any
22 sources -- other sources in the IRW of fecal indicator bacteria
23 or pathogens or undertaken to quantify any bacterial loading
24 from any other sources.

25 In addition to talking to Dr. Harwood about whether

1 she had done anything to update her theory or her methodology
2 from what she presented at the PI hearing, we also talked to
3 Dr. Macbeth, Tamzen Macbeth, who works at North Wind, which as
4 Your Honor will recall is the lab that developed the biomarker
5 technology or theory here and did all the testing, the
6 environmental testing that Dr. Harwood relies on.

7 And Dr. Macbeth can confirm for us that North Wind
8 also was done with its role in the case, at least as of that
9 point, October of 2008 -- they were done with their role in the
10 case, at least as of October of 2008.

11 And North Wind, as I said, they developed the
12 biomarker, they did the testing that -- the environmental
13 testing that Dr. Harwood relies on. And they provided
14 Dr. Harwood with a report in December of 2007.

15 Waiting on the next slide, Your Honor. Thank you.

16 And Dr. Harwood confirmed at her deposition in July
17 of 2008 that that report still forms the basis for her
18 testimony.

19 And so based on that, Your Honor, the testimony that
20 Dr. Harwood will present at trial is essentially the same
21 testimony, the same methodology that she presented at the PI
22 hearing. And Your Honor found that testimony to be unreliable
23 under Daubert, a ruling that the Tenth Circuit affirmed.

24 Your Honor excluded her work principally on the bases
25 that it was novel and that it had not been peer reviewed. And

1 it remains the case that Dr. Harwood's case is still novel.

2 Dr. Harwood, in her report, was quite up front about
3 the fact that there is no independent, commercially available
4 or otherwise method for detecting poultry fecal contamination.

5 At her deposition, she was quite up front, as she was
6 at the PI hearing, that she's discovered a bacteria that has
7 not previously been catalogued and therefore has not been
8 studied.

9 THE COURT: But if that's the truth, how could you
10 have made the statement that you made with regard to
11 brevibacteria being found previously in rice and decayed wood?

12 MR. TODD: There are many -- and I can't tell the
13 Court how many, but there are many type of brevibacteria. They
14 are closely related. I'm not sure exactly how different, how
15 many DNA base pair differences there has to be before something
16 becomes a different type of brevibacteria.

17 Dr. Harwood's testimony is that the bacterium that
18 she has discovered is 98 percent similar to something called
19 brevibacterium avium which has been previously identified,
20 although not at all extensively studied. And so brevibacteria
21 tend to be found in the same types of things. And so the point
22 we made was that brevibacterium generally has been associated
23 with the rice hulls and with decaying wood.

24 THE COURT: Do we know whether this same DNA strand
25 is found in the similar related brevibacterium? Or is it the

1 one that Dr. Harwood found unique to this particular species?

2 MR. TODD: I can't answer that categorically because
3 we haven't had the opportunity to extensively study all
4 brevibacterium. We haven't found it in any other type of
5 brevi- -- actually, I take that back, Your Honor. Dr. Myoda,
6 in his work, found a similar signal in a number of different
7 types of brevibacterium. That's been set out in his report.

8 THE COURT: When you say "similar signal," similar
9 strand of DNA?

10 MR. TODD: What he found was that the PCR process,
11 the PCR assay that Dr. Harwood developed, reproduces something
12 from those other types -- from some other types of
13 brevibacterium. You then have to take it a step further. You
14 have to sequence the DNA to see whether it's exactly the same
15 thing. And he hasn't had an opportunity to do that yet.

16 THE COURT: But will the PCR assay yield a positive
17 result as against these other species of brevibacterium?

18 MR. TODD: Some of them, yes, Your Honor, which
19 obviously goes to the specificity, the ability of this
20 biomarker to actually be an effective identifier.

21 THE COURT: Now, you contend that plaintiffs found
22 the same genetic sequences in geese and ducks. Are we talking
23 about the exact same genetic sequences?

24 MR. TODD: Yes, Your Honor, that's correct. And I
25 believe that actually has been sequenced, and it's either

1 identical or identical to within one or two base pairs. Since
2 we're talking about a 570-some-odd base pair strand, that's
3 pretty close to identical. And that's the testimony from
4 Dr. Macbeth that that's considered identical in this neck of
5 the scientific world.

6 THE COURT: To the extent you argue that Dr. Harwood
7 doesn't know whether her DNA sequence is carried by other types
8 of bacteria, are you saying that most likely there are other
9 species of brevibacteria which would contain this DNA sequence,
10 or are you saying other diverse bacteria may also contain the
11 same DNA sequence? Which would seem to me to be -- of course
12 I'm speaking out of total ignorance here -- would seem to be
13 far less likely.

14 MR. TODD: It could be either. It is probably most
15 likely that it would be another type of brevibacteria, but it's
16 likely or it's possible that it could be another bacteria,
17 period.

18 The way that the folks at North Wind went about
19 determining whether this thing had been catalogued previously
20 was they ran what's called a BLAST search. There's a
21 database -- and I couldn't tell Your Honor what it stands for.
22 But the BLAST database is a catalog of all known bacteria. And
23 the testimony is that that contains about maybe two percent of
24 the bacterial universe. There are trillions of bacteria out
25 there, billions of different types of bacteria. Very few of

1 them have been identified and cultured and their DNA
2 sequenced.

3 And so when you -- and Dr. Macbeth, at her
4 deposition, was quite honest about this. When you take a DNA
5 strand that you've found from a bacterium and you run it
6 through this database, it will tell you if someone else has
7 found it before. But it says nothing about all the DNA, the
8 bacteria that haven't been identified and haven't been
9 catalogued.

10 So when North Wind sends Dr. Harwood a report which
11 says that this bacterium has been -- or this biomarker has been
12 demonstrated to be specific, they're only talking about within
13 the universe of BLAST and within the universe of the animals
14 they actually tested. We can talk about them later. The sheep
15 -- I'm sorry, the swine, the pig, humans, cattle and geese. So
16 not a particularly extensive battery of testing.

17 THE COURT: Do I understand correctly that Dr. Myoda
18 isolated this specific bacteria from cow hide, other water foul
19 samples, and you say from unused bedding material?

20 MR. TODD: That's correct.

21 THE COURT: What are we talking about?

22 MR. TODD: That's correct, Your Honor. What we're
23 talking about there is clean litter.

24 THE COURT: But to the extent that brevibacteria is
25 contained, as you suggest -- I mean, I don't know if it's mere

1 speculation, because it's not really in this record, but you're
2 suggesting that this bacterium is found largely in the bedding
3 material itself, correct?

4 MR. TODD: According to plaintiffs' testing, they
5 found it in bedding material. Dr. Myoda's testing suggests it
6 could be in bedding material before it's exposed to poultry.

7 THE COURT: But it really doesn't matter for purposes
8 of the validity of Dr. Harwood's theory. I mean, it could be
9 found in the bedding material; I mean, assuming similar fate
10 and transport, right?

11 MR. TODD: What it suggests is alternate sources.
12 Chicken houses is not the only place in the IRW where there are
13 rice hulls or hay or --

14 THE COURT: Well, you don't use rice hulls in very
15 much other than bedding material in Northeastern Oklahoma, do
16 you? I mean, the nearest area of -- source of rice is Eastern
17 Arkansas, right? I've got a brother who was an agricultural
18 agent in Eastern Arkansas. Frizzells have done everything.
19 And there's a lot of rice farming in Eastern Arkansas, I know
20 that.

21 But there's not much use for rice material, rice
22 hulls in Eastern Oklahoma other than poultry bedding material,
23 correct?

24 MR. TODD: I can't speak to that, Your Honor, but I
25 think I can safely assume there's more. There's rotting wood

1 places other than --

2 THE COURT: All right. But to the extent that it's
3 found in unused bedding material, it doesn't necessarily
4 invalidate Dr. Harwood's theorem, assuming similar fate and
5 transport, correct?

6 MR. TODD: By itself, I'd say no.

7 THE COURT: Of course, does she say that the
8 brevibacterium comes through the intestine of the chicken or
9 she just doesn't -- it doesn't matter to her?

10 MR. TODD: She doesn't, Your Honor. She started with
11 the litter. She never tested poultry feces to see if it's
12 actually in the chicken.

13 THE COURT: But I understand her point. It doesn't
14 really matter as long as they're conjoined in the chicken
15 house, right?

16 MR. TODD: It matters, but only at the very front end
17 of the analysis. That's why the whole fate and transport issue
18 is important.

19 THE COURT: Correct. I understand.

20 MR. TODD: Because to the extent there are multiple
21 sources of this thing, to the extent that it persists and moves
22 at different rates than indicator bacteria, then it's not
23 really evidence that any fecal indicator bacteria in water a
24 hundred miles downstream came from chickens.

25 THE COURT: All right.

1 MR. TODD: And what Dr. Harwood was undertaking here
2 was to identify something to do that to make that leap that has
3 never been done before.

4 Your Honor will recall this e-mail -- we should do
5 this -- the PI hearing of Dr. Harwood and some of her
6 colleagues e-mailing back and forth regarding whether what they
7 were looking at was new.

8 And they said the stuff is -- these primers have not
9 been demonstrated before. They're entirely new. This is novel
10 research. It's not standard.

11 THE COURT: I understand. But that in and of itself,
12 although it can be considered in a Daubert analysis, is not
13 fatal to Dr. Harwood's theory, right?

14 MR. TODD: It's one consideration of a number,
15 Your Honor. What it does is, it raises the bar, the fact that
16 it hasn't been demonstrated previously, that it's something
17 that was conceived of for this litigation, that it's something
18 that hasn't been peer reviewed, although we'll talk about peer
19 review in a little bit. It raises the bar for the other
20 considerations and for the Court to feel comfortable with this
21 to let it in.

22 THE COURT: I read every word of the peer -- three
23 peer reviewers, so I'm familiar with that.

24 MR. TODD: So why don't we go ahead and turn to that
25 at this point, Your Honor.

1 Dr. Harwood, at the preliminary injunction hearing,
2 told you that she would -- that it hadn't been peer reviewed
3 yet and that she would subject it to peer review, and indeed
4 she did.

5 She and Dr. Olsen and Dr. Macbeth and Dr. Weidhaas, a
6 colleague of Dr. Macbeth's, put together an article which did a
7 number of things. First, it described the procedure by which
8 the biomarker was developed. And then it set out some of the
9 results of the field testing that was conducted in this case.
10 And then it set out some conclusions.

11 What was interesting about the conclusions in the
12 article was that they were actually softer than the conclusions
13 that were presented in court. As the slide here shows, Your
14 Honor, the conclusion in the article was that the results
15 indicated that the watershed is, in fact, being impacted by the
16 application of poultry litter to fields within the watershed.
17 However, the magnitude of the impact as measured by the
18 distribution of the biomarker within the watershed cannot be
19 quantified with the limited number of environmental samples
20 processed to date.

21 But the box beneath that, Your Honor, is the
22 testimony that Dr. Harwood offers in her expert report, which
23 is that the biomarker, her PCR process demonstrates that land
24 application in the IRW presents a substantial, serious and
25 immediate threat to human health.

1 Notwithstanding that, the folks at the Journal of
2 Applied and Environmental Microbiology, the journal to which
3 Dr. Harwood submitted this article, took a look at it.
4 Interestingly, Dr. Harwood is actually on the board. She's a
5 peer reviewer for that journal, so she's quite known to them.
6 But they rejected the article twice.

7 I thought it would be helpful to just look at some of
8 the comments the peer reviewers had. Because the --
9 interestingly, the peer reviewers identified a number of the
10 same concerns that the defendants did at the preliminary
11 injunction proceeding and have identified in their to motion to
12 strike her testimony.

13 The article was actually rejected twice, the first
14 time in September of 2008, and AEM wrote that the peer
15 reviewers had concerns about lack of controls, the lack of
16 sufficient data to validate the marker, and that some of the
17 material -- the way the material was presented was inadequate
18 and even inappropriate for a scientific journal.

19 Then it was -- Dr. Harwood reworked it, made some
20 changes to it and resubmitted it, and it was rejected again in
21 January of 2009.

22 The first time around, all three of the reviewers, as
23 Your Honor knows from looking at it, had substantive concerns;
24 the reviewer comments were 16 pages single spaced. The second
25 time around, the comments were more slender, but two of the

1 three reviewers had substantive criticisms, which included the
2 lack of necessary controls and the lack of appropriate
3 statistical analysis.

4 So to group these somewhat loosely, the peer
5 reviewers were concerned first with the manuscript's failure to
6 demonstrate host specificity. One peer reviewer wrote, "The
7 amplification of a goose and duck sample with the 'litter
8 specific' primers suggests that avian species in general may be
9 detected."

10 Another wrote that perhaps the authors had not tested
11 sufficient control samples because it may be possible that the
12 biomarker may be found in the environment generally.

13 These concerns, Your Honor, are consistent with the
14 findings that have been made by both sides in this litigation.
15 North Wind's own work found the biomarker, the identical
16 biomarker in one goose sample and in one duck sample.

17 And Dr. Myoda's work found it a number of other
18 places. He found it in goose flop, in beach sand in an area
19 that was used by geese, suggesting it can persist in the
20 environment after the geese had left. Found it in other water
21 fowl, and found it in a couple of cowhide samples.

22 Dr. Macbeth, as I said earlier, agreed that the claim
23 that North Wind made that the biomarker is specific to poultry
24 was limited to the very small number of tests that they had
25 done.

1 Dr. Harwood, at the preliminary injunction
2 proceeding, testified that she believed that the biomarker was
3 present in other animals, albeit in her testimony at low rates,
4 but that admission was made.

5 And so if you add all of these up, Your Honor, it
6 really calls into question whether the biomarker is an
7 effective hook to hang on to identify fecal indicator bacteria
8 in the environment as coming from poultry.

9 And for this reason, the journal found that the
10 efforts described represented an uncontrolled trial from which
11 no conclusions regarding the utility of the assay can be
12 extracted, and they rejected it.

13 The next area of concern that a number of reviewers
14 had was statistical analysis. And we'll talk about this
15 somewhat in conjunction with Dr. Cowan's testimony. The
16 reviewers questioned whether the manuscript was lacking in
17 sufficient statistical analysis as to make the claims that it
18 makes supportable. They criticized some of the sampling
19 techniques which torque artificially the statistical
20 conclusions that were made.

21 Dr. Cowan's point is a very simple one, Your Honor.
22 The plaintiffs tested a decent number of cattle samples; I
23 think ten cattle samples that were composited. They tested
24 goose and duck and some swine and some humans, but very, very
25 low numbers.

1 And what Dr. Cowan did was -- and to back up.
2 Dr. Harwood then extrapolates from those tests to conclude that
3 the biomarker is not present in those populations. Dr. Cowan
4 simply provides the statistical analysis that would have to be
5 done to support that claim and shows that, with the exception
6 of cattle, where you can make a limited projection, the rest of
7 the tests tell you nothing. All they tell you is whether or
8 not it was present in a specific sample that was tested. So
9 the weight Dr. Harwood would put on that testing simply isn't
10 there.

11 THE COURT: As I understand it, the fact that you can
12 make limited assumptions statistically with regard to the
13 cattle is because the number of samples that were taken.

14 MR. TODD: That's true. But samples that were
15 composited -- and Dr. Cowan goes on to talk about the problem
16 with cluster sampling. They didn't -- the plaintiffs didn't
17 take -- or the folks from Camp Dresser McKee didn't take just a
18 single cow pie, put it in a baggie and go test that. They went
19 out and grabbed a number of different ones from around the
20 field and then spun them all together. So the result tells you
21 whether or not the biomarker is present in that grouping, but
22 it doesn't tell you which animal it came from. You also don't
23 know how many different cattle you actually tested.

24 The State will tell you they tested 200 cattle, but
25 we have no way of knowing that because we don't know which

1 cow's patty was picked up. I'm not even opening the door to
2 the whole cow thing, Your Honor. I'm going to move on, unless
3 you have any more questions on that point.

4 THE COURT: No.

5 MR. TODD: Then we're in the same boat.

6 The final area, loosely grouping as I said, that peer
7 reviewers had concerns with was the failure of the authors to
8 account for ultimate sources of bacteria and to correlate the
9 biomarker with the indicator bacteria along the -- through the
10 pathway, along the chain from poultry house down to Lake
11 Tenkiller.

12 And I've pulled out a couple of examples of the peer
13 reviewers' concerns on this front. This goes back to what we
14 were talking about earlier, Your Honor, the whole fate and
15 transport issue.

16 The biomarker method assumes that the biomarker, or
17 at least the bacteria that carries it, shares fate and
18 transport characteristics with the fecal indicator bacteria
19 that are coming from the poultry.

20 We asked Dr. Harwood about this specifically. What
21 is an effective marker? In order for it to indicate the
22 presence of bacteria derived from poultry, is it necessary that
23 the *brevibacterium* that you identified share the fate and
24 transport characteristics of the area bacteria from poultry
25 litter? She said, yes, it would have to have certain fate and

1 transport characteristics in common.

2 If the fecal indicator bacteria die two weeks later,
3 but the brevibacterium carrying the biomarker sails on down the
4 river quite happily and then meets up with fecal indicator
5 bacteria from cattle or any other source, then it's indicating
6 those other sources; it's not indicating poultry.

7 But the slides we looked at earlier confirm that
8 Dr. Harwood never looked at any of these questions. She hadn't
9 looked at them before the PI hearing. She hasn't looked at
10 them subsequently. And this is why the fact that there are so
11 many ultimate sources in the watershed, why that fact matters.

12 At the end of the day, there is no way of knowing
13 whether fecal indicator bacteria, E. coli, and enterococci
14 found in Tenkiller or river waters actually came from poultry
15 because that analysis hasn't been done.

16 Mr. Page raised the question of what is a traditional
17 fate and transport analysis. Well, I think, Your Honor, that's
18 my fault for phrasing it quite that way in some of the briefs,
19 saying "a traditional fate and transport analysis."

20 But what fate and transport analysis is, as Mr. Page
21 said, it's specific to the thing you're looking at. How does
22 this brevibacterium persist in the environment? What kills
23 it? How does it move? How quickly does it move? And
24 Dr. Harwood and Dr. Macbeth admitted that things -- that
25 different bacteria move differently, persist differently.

1 And so if you haven't studied the characteristics of
2 the specific bacterium you're looking at, it's just wrong.
3 It's unsupportable to assume that they move together.

4 Let me put up this next slide here. This was an
5 interesting comment that was made by Dr. Weidhaas, who was
6 Dr. Macbeth's colleague at North Wind. Dr. Harwood
7 presented -- as Your Honor will recall from the PI hearing, she
8 presented some correlations between the biomarker, the
9 brevibacterium, and E. coli and enterococci, but she only
10 looked in the poultry litter. She said they're correlated in
11 the litter. But that tells you nothing about whether they
12 remain correlated on the fields, in runoff, in streams, in
13 rivers, in ground water, unless they remain correlated at each
14 step. That's the only other way you can possibly reach the
15 assumption that she's making that they move and persist in the
16 environment together.

17 And so Dr. Harwood presented her correlation to the
18 folks at North Wind, and this is what Dr. Weidhaas had to say.
19 And I've bolded, highlighted the key bit in the middle. But
20 she recognizes the fact there are multiple sources of fecal
21 coliform in the IRW kind of dooms the assumption that
22 Dr. Harwood is making in the context of this litigation. You
23 simply cannot assume it comes from chickens.

24 So, Your Honor, without that fate and transport work,
25 Dr. Harwood's biomarker is simply an unreliable method. It's

1 not a reliable method of linking fecal indicator bacteria back
2 to poultry. That's why it should be -- it's novel, it's
3 untested, it's been rejected by peer review twice for these
4 very reasons, and that's why we suggest that it should be
5 rejected in the context of this case.

6 The one other thing I want to touch on before I sit
7 down, Your Honor, is in the opposition brief, we saw some
8 effort to uncouple Dr. Harwood's health effects-related
9 testimony from the biomarker.

10 (Off-the-record discussion.)

11 MR. TODD: In her report, it's quite clear,
12 Your Honor, that Dr. Harwood's health effects testimony,
13 specific to the IRW, are based in large part on her -- oh, here
14 we go, here's the excerpt -- on her biomarker testimony.

15 Certainly, as the plaintiffs are fond of doing, she
16 considered the lines of evidence approach, but the Daubert test
17 focuses on the individual specific methodology that the
18 specific expert is putting forward. In Dr. Harwood's case,
19 that is the biomarker. She relies on the biomarker in her key
20 concluding paragraph that there is a substantial, serious and
21 immediate threat to human health posed by bacteria from poultry
22 litter in the IRW.

23 THE COURT: As I read this, of course, she
24 specifically mentions salmonella and campylobacter, which are
25 associated with poultry waste, but there was also testimony at

1 the preliminary injunction hearing about its relationship with
2 E. coli. Does she ever tie that in in her Rule 26 report?

3 MR. TODD: She mentions -- much as she did at the PI
4 hearing, she mentions that they are found in poultry litter,
5 the pathogenic bacteria. But she doesn't go beyond that
6 because, as Your Honor will recall, the State tested these
7 bacteria throughout the IRW. They found no campylobacter and
8 they found de minimus levels of salmonella that were so low
9 they couldn't be attributed to any particular source or really
10 even quantified. So she didn't try to take that further.

11 But her testimony will be that the biomarker
12 indicates that fecal indicator bacteria must have come from
13 poultry, and then because fecal indicator bacteria indicate the
14 presence of pathogens, there must be pathogens nearby. But the
15 problem is here, we have no pathogens. The State looked for
16 them; they couldn't find them.

17 Here are some of the other lines of evidence that are
18 not available to Dr. Harwood to reach her health-related
19 conclusion. The State admits that they can't find a single
20 person sickened by exposure to poultry litter.

21 Dr. Harwood testified to that at the PI hearing, and
22 that's now explicit in their RCRA -- their brief in opposition
23 to our motion to dismiss their RCRA claim. They haven't found
24 the pathogenic bacteria. They have no evidence of associated
25 illnesses.

1 In Dr. Harwood's Rule 26 report, she talked about
2 some other syndromes. She talks about Guillain-Barre
3 Syndrome. She talks about acute febrile respiratory illness.
4 I think I'm getting the name right, I can't swear to it. She
5 talked about something called Reiter's Syndrome. But these are
6 all just mentioned generally in her report as things that might
7 be associated with campylobacter. But there's now -- again,
8 she admits she has no evidence of any of these occurring in the
9 IRW, and certainly not occurring as a result of exposure to
10 poultry litter.

11 She -- her conclusion is also based in part on the --
12 you remember the whole issue, Your Honor, over the water
13 quality standards that were promulgated by EPA in 1986 that
14 were based entirely on human-impacted waters. And we've put in
15 some evidence that EPA is now reconsidering those in light of
16 the fact that they don't necessarily bear the same health risk
17 conclusions when you're dealing with water that's only impacted
18 by animal sources.

19 Dr. Harwood relies on those, but those assume full
20 body emersion, which is head under water, completely in the
21 river. But at her deposition, she acknowledged she has got no
22 idea how often recreators in the IRW are fully emersed in the
23 water. She also testifies she doesn't know --

24 THE COURT: Frankly, I don't know that you want to
25 raise that. I mean, clearly people's heads go under the water

1 when they're canoeing, when they're recreating in the IRW. Do
2 you really want to go there? That really doesn't pass the
3 smell test.

4 MR. TODD: Your Honor, I'm not saying it doesn't
5 happen, but I'm saying that simply numerically applying the
6 EPA's 17 per thousand estimation to the number of recreators in
7 the IRW, the number given by Dr. Caneday in factoring out how
8 many sick people there must be out there, even though they
9 can't be found -- and that's what Dr. Harwood would love to
10 do. But that's not an analysis that she has the basis to do,
11 to provide.

12 THE COURT: Well --

13 MR. TODD: At any rate --

14 THE COURT: I'm not persuaded.

15 MR. TODD: Then that's on me, Your Honor.

16 THE COURT: I doubt if you or Mr. George would send
17 your children down to the IRW if we knew that there was fecal
18 indicator bacteria there and just tell them just don't stick
19 your head under the water. You know, that just doesn't pass
20 the test. I'm sorry. Go ahead.

21 MR. TODD: Your Honor, my basic point is a simple
22 one, and that is that without the biomarker, Dr. Harwood
23 doesn't have any other basis to make an allegation of health-
24 related effects resulting from poultry litter. The biomarker
25 is essential to that. So we would resist the uncoupling that

1 plaintiffs have attempted.

2 Unless Your Honor has any other questions, I'm happy
3 to sit down.

4 THE COURT: Are you going to be touching on Cowan and
5 in the 2099 motion, or who will be touching on those?

6 MR. TODD: That will be me as well, Your Honor.

7 THE COURT: Should we just handle them all together?

8 MR. TODD: I have essentially said what I have to say
9 about that, which is if we're going to --

10 THE COURT: You haven't talked about hold times.
11 Hold times is 2099.

12 MR. TODD: Hold times is Mr. Jorgensen.

13 THE COURT: All right.

14 MR. TODD: With regard to Dr. Cowan, if we're
15 limiting it at this point to the Harwood universe and not the
16 Olsen universe, most of the State's challenge to Dr. Cowan goes
17 to his comments on Dr. Olsen's PCA analysis.

18 THE COURT: But it also touches on Harwood.

19 MR. TODD: The argument, as I understand it, is that
20 Dr. Cowan is unfit to testify in an environmental litigation,
21 environmental lawsuit, he's not a natural scientist and he
22 doesn't understand the intricacies of polymerase chain
23 reaction.

24 With regard to Dr. Harwood, all Dr. Cowan says is, if
25 you test three pigs, you cannot assume from that, you cannot

1 extrapolate from that that every single pig does or does not
2 carry this particular biomarker. It's pure statistics,
3 Your Honor. He doesn't need to understand a shred of the
4 science, the natural science part of the case to give that
5 testimony.

6 To go back to Mr. George's accident reconstruction
7 analogy, if someone was offering an accident reconstruction
8 expert and the expert misadded two plus two and said it was
9 five, I think you could bring a mathematician in to say you
10 added up wrong without needing to understand the physics of the
11 rest of the reconstruction. That's all that's happened here,
12 Your Honor.

13 If Mr. -- Whoever is speaking for the State has more
14 to say about Dr. Cowan, I'll be happy to respond to it, but I
15 think that's pretty much the sum of it with regard to the
16 Harwood portion of that motion. Thank you, Your Honor.

17 THE COURT: Thank you very much.

18 Mr. Page.

19 MR. PAGE: Wasn't sure if we were going to break or
20 not. I was just hesitating there.

21 Your Honor, David Page for the State of Oklahoma, and
22 I'll be speaking in response to the defendants' Daubert motion
23 on Dr. Harwood.

24 Your Honor, we just heard Mr. Todd speak quite often
25 about Dr. Macbeth in his challenge and quoting her deposition

1 quite often.

2 Your Honor, Dr. Macbeth was part of the lab that
3 Dr. Harwood used to identify the biomarker for poultry. She
4 was well known by the defendants. In fact, the defendants took
5 her deposition. We think it's manifestly unfair that we would
6 strike her declaration now in this case and support a response
7 to Dr. Harwood's challenge, where they clearly knew about her,
8 clearly took her deposition, used her in the motion; and, in
9 fact, have designated portions of her deposition for use of
10 trial in this case, Your Honor. We think it's -- and I know
11 you're going to --

12 THE COURT: Well, I'm not prepared -- let me see if I
13 can dig that order up. We're going backwards again. Just a
14 second.

15 MR. PAGE: I apologize for going backwards,
16 Your Honor, but it's part of their evidence and --

17 THE COURT: Just let me -- I was not prepared to go
18 backwards. Just one second. Who are we talking about here?

19 MR. PAGE: Dr. Macbeth. Again, I'll just offer as an
20 offer of proof --

21 THE COURT: Just one second, please.

22 MR. PAGE: It's Exhibit F.

23 THE COURT: No, we're not on the same page.

24 MR. PAGE: I'm sorry.

25 THE COURT: I'm looking in my opinion in order 2379.

1 Where do I talk about Macbeth? 17-page order entered Friday.

2 MR. PAGE: Yes, Your Honor.

3 THE COURT: I see. Page 12. All right. Let me read
4 it and see if I can get up to speed with where you want me to
5 be.

6 You're saying that although there are consulting
7 experts that the other side took their deposition and used them
8 in conjunction with this motion, is that what you're saying?

9 MR. PAGE: Yes, Your Honor.

10 THE COURT: All right. Any response there?

11 MR. TODD: We did, Your Honor, but the -- we used
12 some of her testimony substantively. I don't have the
13 motion -- or I'm sorry, the declaration in front of me, so I
14 can't go paragraph by paragraph. But what I can tell you
15 generally, as I recall Dr. Macbeth's affidavit, is that it went
16 much more to bolstering and to providing new analyses to
17 support Professor Harwood's theory than it did to explaining
18 challenges that were raised in the context of our motion. The
19 key one I'd point out is that --

20 THE COURT: You're going to have to break this down
21 because I wasn't prepared to go back here. Macbeth is their
22 consulting expert, right?

23 MR. TODD: Macbeth is at North Wind lab. She's their
24 consulting expert. She did the work. She devised biomarker
25 theory.

1 THE COURT: How in the world did you use Macbeth in
2 the context of this Daubert motion?

3 MR. TODD: Yes, of the motion to strike Professor
4 Harwood. Let me explain how, Your Honor.

5 THE COURT: All right.

6 MR. TODD: North Wind did all the work. They did all
7 the testing, they devised the theory. They then sent Harwood a
8 report, December 2007. We put it in evidence in the PI
9 hearing. Big report. That's the basis for Professor Harwood's
10 testimony. She didn't do any of the testing. She didn't
11 conceive of the theory. So she was testifying to the work that
12 North Wind did.

13 When we took her deposition the first time, there
14 were a number of points where she simply said, I couldn't tell
15 you that. In technical detail, I couldn't tell you why this or
16 that was done. You'd have to go talk to North Wind. So we
17 did. We took Macbeth's deposition.

18 Now fast-forward. So we used to that explain some of
19 the technicalities of the PCR work in the Harwood motion.

20 The declaration that Mr. Page put in doesn't just go
21 to explaining things that were touched on in the deposition.
22 It provides new analysis. It provides -- it cites articles,
23 provides history that Dr. Harwood had never provided before,
24 and it talks about new testing.

25 You'll recall I showed a slide from the Macbeth

1 deposition from October 2008 where she said, we're done, North
2 Wind is done testing, but then they come in with this
3 declaration which talks about hundreds of new tests run in
4 dozen of states across the country. That's new analysis, Your
5 Honor, that's bolstering. That's why that should be out. I'm
6 happy to go --

7 THE COURT: See, this is why this is tedious, because
8 he's suggesting that there may be statements within the new
9 testimony that ought not to be excluded. So do you all want me
10 to take a half an hour here and you can highlight that which is
11 not new, and you highlight for me that which is new, and then
12 I'll consider whether it's new or not and then allow
13 Ms. Macbeth's -- or the portion of Ms. Macbeth's declaration
14 that isn't new to come in? Because if not, you're treading on
15 difficult ground.

16 Why don't do we do this: Okay. How many paragraphs
17 is Macbeth's declaration? This is one of the perils of
18 throwing new materials in a declaration. But to the extent
19 that it responds to whatever you brought up in the Daubert
20 motion, it's proper.

21 We'll take a recess, allow you to do it. I want to
22 see highlighted portions from both sides. Plaintiff, give me a
23 highlighted portion of that which responds to the allegations
24 or the statements that Macbeth made that the defendants used in
25 connection with this motion; and if I agree, I'll consider

1 those. If they're new, we won't. We'll be in recess.

2 (Whereupon a recess was had.)

3 THE COURT: Mr. Todd, could you point out to me where
4 you refer to Macbeth in your Daubert motion so I can see the
5 subject matter here and determine whether or not any of these
6 are directly responsive to your use of Macbeth there.

7 MR. TODD: Your Honor, that's what I was sitting here
8 doing. And we refer to her a number of times, although not
9 very often relying on her testimony because she's a character
10 involved in this story.

11 THE COURT: You understand the problem. And I know
12 there's a right hand/left hand problem here, but to the extent
13 that you wish to -- as a group of defendants, wish to exclude
14 her testimony and yet you use her -- you know, we can spend the
15 rest of the day and part of tomorrow going into whether or not
16 some of these paragraphs -- and there are, oh, six or seven as
17 to which there are disputes. We can spend, oh, a good two or
18 three hours trying to determine whether or not any of these are
19 responsive to your use or whether you've opened the door to the
20 use of Macbeth, so -- so point me out to how you used her in
21 your motion -- in your Daubert motion.

22 MR. TODD: I think you're exactly right as to the
23 relevant considerations here, Your Honor. To the extent that
24 we cited her for some purpose, it would have been appropriate
25 to put in the declaration saying, they cited me saying X at my

1 deposition, and here's what I actually meant. But if you go
2 through the declaration, you don't see that anywhere.

3 I thought what you had asked Mr. Page to do is to
4 identify where he was making that use of her.

5 THE COURT: I see on page 15 you say, "Dr. Macbeth
6 agrees that in order 'to develop an assay that can be used to
7 track poultry litter anywhere in this watershed, it's important
8 to start with a representative litter sample.'" Where else
9 have we referred to her?

10 MR. TODD: I see her on page 8, Your Honor, at the
11 top of the page. This is actually the quote from the e-mail
12 that we used at the PI hearing. And so that's been in the
13 record for a long time.

14 THE COURT: All right. And that's the e-mail that
15 you've highlighted a number of times?

16 MR. TODD: Right, Your Honor, where she admits the
17 work is novel. And Dr. Harwood was also on that e-mail chain.

18 The next reference I see to Dr. Macbeth is on page
19 12, four lines up from the bottom where she acknowledged in her
20 deposition that the claim of host-specificity was accurate only
21 in the context of the work that North Wind actually did, the
22 samples actually tested.

23 On page 13 --

24 THE COURT: Just one second. Let me see if I can
25 digest this.

1 MR. PAGE: There's also another reference on the
2 bottom of page 12 as we move through here.

3 THE COURT: I thought that was the one he was
4 referring to. No?

5 MR. PAGE: There's one at the top of page 12,
6 Your Honor, and the bottom of page 12.

7 MR. TODD: Where's the one at the top, David? which
8 one?

9 THE COURT: Yeah, I don't see the one at the top.

10 MR. PAGE: Exhibit 10 referenced in the second line
11 in the middle. Exhibit 10 is Dr. Macbeth's deposition
12 testimony that's attached.

13 MR. TODD: Thank you. That was her acknowledgment --

14 THE COURT: Let me --

15 MR. TODD: -- that they hadn't done fate and
16 transport analysis.

17 THE COURT: Let me go back and read that deposition
18 testimony. Let me start a list of the subject matters.

19 MR. TODD: Your Honor, I would note there's nothing
20 magical about the fact that Dr. Macbeth was deposed. All of
21 their experts have been deposed, but that's not the basis for
22 new analysis or bolstering --

23 THE COURT: Typically consulting experts are not
24 deposed, correct?

25 MR. TODD: Well, no, sometimes they are when the

1 testifying expert -- let me take a step back. This is the
2 whole point of the Seventh Circuit's opinion in the Dura case
3 which we cited to you in our motion to strike the declarations
4 where the testifying expert didn't actually do the work, when
5 some other expert did.

6 And here Dr. Macbeth said that her area of expertise
7 was the PCR, not Dr. Harwood's area of expertise. It's
8 fundamentally unfair for the nontestifying consultant who
9 actually did the work to show up at the Daubert phase and
10 testify about how the work is all appropriate.

11 THE COURT: Except here you're using the
12 nontestifying expert in your Daubert motion.

13 MR. TODD: Your Honor, we agree with you that to the
14 extent that the declaration responds to a specific use we made
15 and she is clarifying her comments of the deposition, that
16 would be appropriate, but that's not what's in this
17 declaration. This declaration is explaining theory that should
18 have come from Dr. Harwood and is explaining new testing that
19 was done after -- long after the report deadline.

20 THE COURT: I'm trying to make a list of subject
21 matters. That's page 12. Let's start from the very beginning,
22 which is usually a good place to start, and tell me again the
23 earliest reference to Macbeth.

24 MR. TODD: The earliest one I found was on nine.
25 David, have you found any before that?

1 THE COURT: I find one on four here.

2 MR. TODD: Okay.

3 THE COURT: It just says Roger Olsen and North Wind
4 scientists Macbeth and Weidhaas submitted a manuscript. So
5 that really doesn't -- that's just background.

6 MR. TODD: She's was a coauthor.

7 MR. PAGE: The first substantive reference,
8 Your Honor, I believe is on top of page 8 where it's this
9 e-mail that it's novel. And Dr. Macbeth, in some of those
10 paragraphs, identified -- explained what she meant by "novel."

11 THE COURT: All right.

12 MR. PAGE: So the methodology is not novel. So
13 that's --

14 THE COURT: Let's -- before you make your argument,
15 let me just make a list here. All right. I'm just trying to
16 take -- I'm doing the best I can here. We're going to have to
17 slug through it. Just give me a second. I can't listen to
18 what you're saying and also make my list here. So just hold
19 your fire.

20 After page 8, what's the next page?

21 MR. TODD: We had identified the ones on 12. Do you
22 have anything else before then, David?

23 MR. PAGE: Top and bottom of 12, Your Honor.

24 THE COURT: Let me -- before we move on, the
25 statement at the bottom of 12 here follows a statement that

1 Dr. Harwood allegedly made of host-specificity based on North
2 Wind's work which reported that the biomarker has been shown to
3 be specific to poultry litter.

4 Then apparently in her deposition, Dr. Macbeth, it
5 says, who led North Wind's research efforts, made clear that
6 this claim is only "an accurate statement within the context of
7 the samples that North Wind analyzed" in this litigation.

8 Does that -- and I guess -- so you're trying to make
9 clear what she meant there. Is she referring to the same
10 genetic sequence being found in geese and ducks and poultry?

11 MR. PAGE: This goes to specificity, Your Honor.
12 It's an issue of specificity. That's what they used it for
13 and --

14 THE COURT: All right. But getting down to brass
15 tacks, is what she saying that it is specific to poultry litter
16 or --

17 MR. PAGE: Yes. That quote is out of context. In
18 her declaration she explains that she believes the marker, as
19 developed, is specific.

20 THE COURT: What does she mean it's only accurate
21 within the context of the samples North Wind analyzed?

22 MR. PAGE: Well, I don't recall -- I don't have the
23 testimony in front of me right now, Your Honor, to look at, but
24 I think the question and the answer is out of context here.

25 MR. TODD: Your Honor, I can explain.

1 THE COURT: Obviously to the extent it's out of
2 context, the plaintiffs are entitled to explain it and put it
3 in context. So that's another subject matter.

4 What else?

5 MR. TODD: The next page, Your Honor, there are two
6 references. One is five lines down from the top. This is
7 about the BLAST database that I talked about.

8 MR. PAGE: It's also referenced three lines down.

9 MR. TODD: Oh, Exhibit 10. I'm sorry. You're right;
10 there is. Same subject matter, though.

11 THE COURT: Thank you. Three lines down, five lines
12 down on page 13. Anywhere else on 13? Yes. Let's see -- down
13 towards the bottom.

14 MR. TODD: The deposition is cited a number of times
15 in the same context there. Then seven lines up from the
16 bottom, she's referred to, and the context here is something we
17 haven't talked about yet, which I'm sure Mr. Page will talk
18 about, which is how accurate a melt curve is at distinguishing
19 between DNA strands.

20 THE COURT: Well, here we make reference to about ten
21 pages of deposition. I can read them all, and you could all
22 sit here and wait for me to read them so I can determine what
23 is relevant or not. Do you want to do that or do you want to
24 just let the Macbeth declaration in?

25 MR. JORGENSEN: Your Honor, may I have just a

1 second?

2 THE COURT: You know, you need to be careful when you
3 ask to strike something but you use the testimony.

4 Mr. Jorgensen, if you all could confer.

5 (Off-the-record discussion.)

6 MR. TODD: Your Honor, to move the process along, all
7 we would object -- we're happy to limit our objection to the
8 new testing, which is the new testing of --

9 THE COURT: Which paragraph, is that in the --

10 MR. TODD: It's throughout. It's referenced
11 throughout.

12 MR. JORGENSEN: Your Honor, if I may.

13 THE COURT: Yes, please.

14 MR. JORGENSEN: I spoke with Mr. Page before, and
15 you'll notice that the yellow highlighting he put on that copy
16 does not cover any of the new testing. He tried to exclude the
17 new testing. So it looks like we're in agreement on that, so
18 we can just let in his yellow highlighting and move on.

19 THE COURT: You all need to remember that although
20 this is high stakes litigation and -- you're also officers of
21 the court. And to the extent that you ask the Court to exclude
22 something and then use part of the deposition, I urge you
23 strongly not to do it in the future.

24 And I've got to say, Mr. Todd, you're doing an
25 excellent job of writing these technical briefs. I take it

1 you've had a hand in authoring these technical briefs?

2 MR. TODD: Yes, Your Honor.

3 THE COURT: Well, you do an excellent job. I would
4 just suggest that perhaps rather than do what's done here --
5 and I don't know who moved to strike this, but I know hindsight
6 is 20/20, but it wasn't a good idea.

7 So do we all agree, then, that paragraphs 1, 3, 4, 7,
8 8, 9, 10, 11, 12, 13, 14, 16, 17, 18 and 19, 20, 21, 22 --
9 there is no paragraph 23 -- 24, 25 can be admitted? And bear
10 in mind that some of these paragraphs here are circled in --
11 only part in yellow.

12 MR. JORGENSEN: Exactly. That's what we're agreeing
13 to, Your Honor. Mr. Page has been good enough, as he said to
14 me, to go through; and if in the middle of a paragraph there
15 was a discussion of new testing, then after the Daubert motions
16 came in, they went out and did -- he excluded that. He
17 highlighted --

18 THE COURT: Well, it would take me another 15 minutes
19 to go through this and identify page and line, so let's just do
20 this: Let's admit this as a court exhibit. And if everyone
21 can stipulate and agree everything that's marked in yellow here
22 is admitted, and the Court's order, which is 2379, with regard
23 to the declaration of Tamzen Macbeth will be amended so as to
24 allow and not strike those portions of the declaration of
25 Tamzen Macbeth. Agreed?

1 MR. TODD: Yes, sir.

2 MR. PAGE: Yes, Your Honor.

3 THE COURT: We'll make this Court's Exhibit 1 for
4 purposes of this hearing.

5 Mr. Todd, anything else?

6 MR. TODD: No, Your Honor.

7 THE COURT: Mr. Page.

8 MR. PAGE: Your Honor, thank you. I think I want to
9 begin by making sure we focus, like we did with Dr. Engel, on
10 the scope of what's being challenged. It's my understanding
11 today, Your Honor, although I'm a little bit confused by what
12 Mr. Todd said a few minutes ago, that they're only challenging
13 the biomarker, and that Dr. Harwood offers other opinions
14 concerning the viability and hazard.

15 Now, I believe what I heard Mr. Todd say is that
16 given the fact that her opinion on hazard and health is only
17 based on the biomarker, then she shouldn't be able to testify
18 concerning health risks. And, Your Honor, I think it's very
19 clear in Dr. Harwood's opinion, her original report and the
20 declaration that was submitted in response to the Daubert
21 motion submitted by the defendants that her opinion concerning
22 the hazard of poultry waste application as it is being applied
23 in this watershed was formed before the PCR and rests on other
24 independent bases.

25 THE COURT: But that's not clear at all. The Rule 26

1 statement that's made here, and that you may be referring to
2 something prior to that, but the Rule 26 statement is tied in
3 with the PCR analysis, correct?

4 MR. PAGE: The rule --

5 THE COURT: I'm sorry.

6 MR. PAGE: The Rule 26, you mean her original
7 report?

8 THE COURT: Biomarker methodology.

9 MR. PAGE: Her biomarker -- it's one line of evidence
10 that supports her opinion.

11 Let me clear something up with regard to the
12 biomarker, Your Honor.

13 THE COURT: Wait. Let's not move on here, because I
14 want to know what you contend the statement is regarding her
15 conclusions regarding risks to human health that are not tied
16 to this biomarker technology.

17 MR. PAGE: All of it. All of it are. Your Honor,
18 she has --

19 THE COURT: All of it are --

20 MR. PAGE: All of her --

21 THE COURT: All of her conclusions are not tied to
22 the biomarker technology?

23 MR. PAGE: No. All of her conclusions concerning
24 hazard of poultry waste application in this watershed are
25 independently supported by other lines of evidence in addition

1 to the PCR.

2 THE COURT: Is that part of her Rule 26 statement?

3 MR. PAGE: Yes.

4 THE COURT: All right. Let's look at that, because
5 it may just be that the defendants are drawing my attention to
6 the portion where she talks about salmonella and campylobacter,
7 which are tied to her biomarker analysis.

8 MR. PAGE: No, they aren't tied to her biomarker,
9 Your Honor. That's just simply not true. The biomarker was
10 created as an example of a dye marker.

11 Let me try to say that again. The biomarker, as you
12 pointed out in Mr. Todd's argument, is not a living thing. It
13 can exist in the environment, and likely does exist in the
14 environment regardless of whether the bacteria is alive or not.

15 THE COURT: Let's go back here for a second. Because
16 my understanding -- and I looked at this yesterday, and I
17 thought I wrote it down right. If I didn't, correct me. But
18 her Rule 26 report recognizes that the biomarker is her link
19 between poultry litter and allegations of health risks from
20 human pathogens such as salmonella and campylobacter.

21 Maybe we need to look at her statement in her Rule 26
22 report.

23 MR. PAGE: That's not a correct interpretation, and
24 that's not what she testified to, Your Honor. She testified --

25 THE COURT: Well, let's find the report. I mean,

1 that controls, right, the Rule 26 report?

2 MR. PAGE: Her Rule 26 report, Your Honor, is
3 Attachment A to our response, docket 2115. Your Honor, on
4 page 3 of her report, paragraph 6, it's under Roman numeral II,
5 Waterborne Disease, begins the discussion of the health risk
6 hazard.

7 And I can probably short-circuit this, Your Honor, by
8 pointing out this: That that report goes on now for 12 pages
9 outlining the health risks and citing lines of evidence of the
10 health risks. Then on page 15 is the first time in her report
11 that she talks about microbial source tracking, which is the
12 concept or the science that creates biomarkers.

13 So all of her report begins, and her testimony in
14 this court talked about the different aspects of the waste
15 application and the evidence in this case that indicates the
16 hazard.

17 And I was prepared today to summarize those, but the
18 amount of waste and its practices, she evaluated that. She
19 looked at the evidence from other experts. And based on her
20 experience looking at other bacterial hazards as a
21 microbiologist, indicated that that would present the amount of
22 waste and how it's applied would present a problem for
23 recreational users; the amount of bacteria, indicator bacteria
24 that are edge-of-field samples from fields that have land
25 application, and then there was rain, and samples were taken

1 from those fields of known recent land application and seeing
2 the amount of bacteria that was runoff. That was also
3 commented on by Dr. Teaf.

4 The known pathogens in poultry and poultry waste.
5 The level of bacteria in IRW streams, both samples by the
6 plaintiffs and the USGS. And then how the rivers are used, the
7 recreational use of the rivers and streams. All of that went
8 into her analysis.

9 And, Your Honor, I could go through some more
10 details, but there's 12 pages of her about 30-page report --

11 THE COURT: Well, I don't want to read all 12 pages
12 or have them read to me right now. I want to know the -- so
13 what you're suggesting to me is that you understand that they
14 are only challenging the methodology with regard to the
15 biomarker and not these other -- and I tried to write them
16 down, but you were going too fast -- numerous areas: The
17 amount of waste and its hazards, known pathogens in poultry
18 waste, the level of bacteria in the IRW, how rivers are used.

19 And then you say amount of indicator bacteria at
20 edge-of-field samples.

21 Well, the minute you go into indicator bacteria,
22 aren't you automatically getting into this area of biomarker?

23 MR. PAGE: No, Your Honor.

24 THE COURT: Because the indicator bacteria you're
25 talking about is *brevibacterium*.

1 MR. PAGE: No, sir. The indicator bacteria I'm
2 talking about are E. coli.

3 THE COURT: Oh, you're talking about fecal --

4 MR. PAGE: Indicator bacteria, yes, sir. And those
5 are the traditional --

6 THE COURT: I understand that --

7 MR. PAGE: I won't go into that.

8 THE COURT: -- I'm fully familiar. You say indicator
9 bacteria in context with Harwood, and I'm thinking
10 brevibacterium.

11 So you're saying that you understand that they're not
12 contesting her abilities to testify on those and apparently
13 other subject matters; is that correct?

14 MR. PAGE: That would be my understanding,
15 Your Honor.

16 THE COURT: Maybe what we ought to do first is
17 concern ourself with the methodology of the biomarker process,
18 and then we'll discuss -- and think about, Mr. Todd, what your
19 response is going to be and, Mr. Jorgensen, with regard to
20 Mr. Page's suggestion that there are other matters that you
21 don't have an objection to allowing Ms. Harwood to testify
22 about.

23 Go ahead. Mr. Page.

24 MR. PAGE: Thank you, Your Honor. Let's go directly
25 to the methodology. Your Honor, I'd like to preface by saying

1 that we argued at the preliminary injunction hearing and that
2 the record is better developed. Quite frankly, Your Honor, I
3 argued that Daubert PI hearing of about two hours' notice for
4 myself, I don't think the record was well developed there,
5 particularly concerning the knowledge of this methodology and
6 how well established it is. And in Dr. Harwood's Rule 26
7 report, she identifies that, and I'm going to outline that for
8 the Court right now.

9 I also would like to point out to Your Honor that
10 what you see today from the defendants is not an argument that
11 I can discern that really says that this biomarker methodology
12 which is based on microbial source-tracking science using
13 library independent methods -- and Dr. Harwood explains all of
14 that in her report -- is not new or novel.

15 In fact, that underlying methodology is well-
16 established. And that Dr. Harwood is among five or six leading
17 experts in the development of biomarkers using library
18 independent methods.

19 And that, in fact, that scientific journals, EPA
20 guidance, and even EPA researchers such as Santo Domingo, Jorge
21 Santo Domingo, whose papers are cited by Dr. Harwood,
22 Dr. Stoeckel by USGS, Dr. Fields at the University of Oregon,
23 Dr. Harwood and Dr. Sadowsky, all of whom are well-known
24 researchers that have applied this methodology in this
25 particular type of context.

1 MR. TODD: I'm sorry, to interrupt, Your Honor. I
2 didn't know if we were going to head down the road again of
3 trying to get in another declaration, but Dr. Page just
4 mentioned Dr. Sadowsky, which is another declaration that
5 Your Honor struck, who performed some evaluation of
6 Dr. Harwood's work long after the Rule 26 report.

7 THE COURT: I haven't heard him ask for that to be
8 reconsidered yet.

9 MR. TODD: I object to the mention, I --

10 THE COURT: I don't want to anticipate any more,
11 Mr. Todd. Go ahead, Mr. Page.

12 MR. PAGE: Your Honor, the library-independent PCR or
13 biomarker methods are well accepted in the scientific
14 community.

15 Dr. Harwood explained that in her Rule 26 report.
16 And there is actually a declaration that was not stricken, was
17 not asked to be stricken, that's Exhibit C to this record from
18 Dr. Harwood that explains that. Also Dr. Macbeth, in the
19 paragraphs that were just admitted, also explains how
20 standardized this methodology has become.

21 In fact, this same methodology, the library-
22 independent method, has been used to identify biomarkers in
23 other avian species, humans and cattle and other ruminants.

24 THE COURT: With regard to ruminants, it was
25 ruminants generally, right? It wasn't specifically cattle.

1 MR. PAGE: It was to ruminants, because that was
2 Dr. Fields' work that's been referenced.

3 THE COURT: Right.

4 MR. PAGE: And at that point, the time that she did
5 her analysis, she wasn't able to identify specifically cattle
6 and deer. However, how the researchers use this methodology,
7 Your Honor, is they look at the likelihood of potential
8 contributions, given the context.

9 THE COURT: Sure.

10 MR. PAGE: And so you don't have to test every
11 squirrel, every woodchuck in the watershed to see if it's
12 specific. If you know you've got 300,000 cattle, then you
13 probably should check cattle. If you've got 300,000 pigs, you
14 should probably check pigs and turkeys and chickens. But you
15 don't check all of them.

16 And the methodology which Dr. Harwood followed and
17 others followed, like Dr. Fields and Drs. Stoeckel and Santo
18 Domingo and other published people like Mike Sadowsky, all of
19 which say you just -- for specificity, you identify what the
20 most likely candidates are and test them to see if the
21 biomarker is identified.

22 Let me be specific, Your Honor. This -- a biomarker
23 is another marker in the litany of markers that have been
24 developed using the same procedure. They've been identified
25 for birds. They have a biomarker for geese specifically, ducks

1 and seagulls, and other animals such as humans, swine and
2 ruminants.

3 So the procedures in this methodology were -- are not
4 novel or new. And I don't think you're really hearing that
5 from the defendants anymore.

6 In fact, Dr. Myoda in his deposition -- and it's
7 referenced in our response -- admits that independent, library-
8 independent methods are valid methodologies.

9 And, you know, Your Honor, although we disagree with
10 how Dr. Myoda did his testing, the fact is, is that he claims
11 to have reproduced the results. Now, he's getting different
12 results in a sense, but he's reproduced the biomarker, he's got
13 a primer, he claims he's done a melt curve.

14 So if it was new or novel or litigation based only
15 science that in my small mind I invented for this case, you
16 wouldn't see his lab, IEH, reproducing it or you wouldn't see
17 the lab from North Wind doing this type of work. This is the
18 work that's done in labs done across the country as microbial
19 source tracking science is being applied to identify sources of
20 contamination.

21 Now, I think it's important, Your Honor, to focus on
22 this dye concept. The biomarker for Dr. Harwood was used as
23 like -- you know how they pour dye in an outlet and see if it
24 gets in the stream, the color is dipped in the stream? The
25 biomarker is being used in that context. It's not being used

1 to show that if you find it, there's a lot more bacteria in
2 that area. It wasn't intended to be correlated that way.
3 Dr. Harwood did not try to correlate it. In fact, she says
4 that that would be foolish to do that because of all the
5 different dilution processes.

6 What the biomarker's purpose was is to see if poultry
7 waste is moving through the environment. It's a unique
8 marker. We can't very well dye mark all the waste coming out
9 of all the barns. But if we know that there is a constituent
10 out there that's unique to poultry waste and we can identify it
11 in these streams and in these rivers, in the groundwater, we
12 know that poultry waste constituents are moving through the
13 environment and getting to these locations.

14 It's not being used to identify the level of hazard.
15 And that's another reason why it's independent, it's not linked
16 to the health issues. What it's saying is, is that bacteria,
17 or at least some part of the bacteria, is moving through the
18 environment and getting to different parts of the IRW.

19 THE COURT: But that begs the question. If there's
20 not at least some -- and I know we've argued about the
21 terminology -- "traditional fate and transport study," how do
22 we know that fecal indicator bacteria are also getting to the
23 same spot that these *brevibacterium* are getting to?

24 MR. PAGE: Well, there's several in many lines of
25 evidence that support that, Your Honor. My purpose was not --

1 was to point this out that -- how the biomarker is being used,
2 but we know about fecal bacteria, first of all, because we know
3 about the amounts.

4 Dr. Teaf did a mass balance for fecal bacteria in
5 poultry waste, and that's part of his testimony before this
6 Court. And so like the mass balance was done for phosphorus,
7 mass balance was done for fecal coliform bacteria in the
8 different animals.

9 All researchers in environmental cases look at mass
10 loadings as a fundamental, basic fate and transport analysis.
11 Who is contributing to the watershed the most of the substance
12 of concern.

13 THE COURT: But if you don't have what has been
14 referred to as the traditional fate and transport, then you've
15 got the alternate source problem that at this point where
16 you're testing, yes, you're showing the biomarker, but you have
17 alternate sources, as in potential cattle or human.

18 MR. PAGE: Your Honor, what I'm describing to you
19 about a mass balance is traditional fate and transport
20 analysis. The point is, is that if you -- one of the lines of
21 evidence is that if you know who's contributing the most of a
22 constituent, the likelihood is, is that when you find the
23 constituent pervasive around the watershed, it's going to be
24 from those contributors.

25 There's other lines of evidence also, Your Honor,

1 that are detailed. Well, let me just talk about -- fate and
2 transport analysis, like chemical-type analysis, aren't used
3 with bacteria. It's not appropriate for bacteria, and
4 Dr. Harwood points that out in her declaration that was
5 attached to the response.

6 THE COURT: Not appropriate to bacteria or fecal
7 bacteria?

8 MR. PAGE: For bacteria. Fecal bacteria. I believe
9 she points out specifically the fecal bacteria.

10 THE COURT: Because this is a bacteria that she's
11 getting the biomarker from.

12 MR. PAGE: Right. That's correct. But what you
13 would make about fate and transport analysis for chemicals
14 isn't the same application for microbial source tracking. For
15 microbial source tracking, they identify whether or not the
16 bacteria, for example the gene, is moving into the environment
17 in those locations. That does not tell you, admittedly,
18 whether or not that particular bacterium is also associated
19 with the hazardous bacterium from that same feces. And
20 Dr. Harwood's analysis isn't going to that point. There are
21 other lines of evidence that support the hazard concept that
22 are not related to the PCR.

23 So I'm being very straightforward with the Court, is
24 that we're not trying to establish because there's a PCR by
25 itself, there's automatically a hazard. You have to look at

1 the other lines of evidence, such as the amount of waste or the
2 amount of fecal bacteria that's being contributed.

3 Other lines are evidence are: What is the
4 methodology? Human waste primarily goes to wastewater
5 treatment plants, which is chlorinated. So that would indicate
6 that fecal bacteria that are hazardous from humans are not
7 likely to be a major role in the watershed because of the
8 chlorination process.

9 On the other hand, poultry waste is applied
10 throughout the watershed, it's not chlorinated before it's put
11 on, it's not treated, so you don't have that change.

12 There are different lines of evidence, Your Honor,
13 that support the concept that Dr. Harwood will be testifying
14 concerning the health. The biomarker is like a dye marker that
15 we know that because the biomarker is there, we understand that
16 bacteria and other poultry waste has opportunity to travel in
17 that location and has traveled there.

18 The defendants' position in this case almost
19 unilaterally amongst their experts -- and I've taken probably
20 the majority of their depositions -- is they don't believe
21 there's any evidence that poultry waste is running off the
22 field. That's their position.

23 THE COURT: At all?

24 MR. PAGE: Well, they don't have any evidence that
25 it's running off.

1 You know, we wanted to have a dye marker, so we've
2 got a dye marker, and that's the brevibacterium DNA sequence
3 that's been identified unique.

4 Now, Dr. Harwood did correlate the brevibacterium
5 biomarker with enterococcus in the litter to show that it's
6 correlated with the litter, that it's likely a fecal bacteria.
7 But when it gets out in the environment, because of dilution
8 and other aspects, it's very difficult to correlate that
9 biomarker, at least at this point in the development with the
10 different bacteria in the environment.

11 So I think, Your Honor, the defendants are no longer
12 really saying this is new or novel in the sense that the
13 methodology is appropriate. And, Your Honor, I would be remiss
14 if I didn't remind the Court that it's the methodology that has
15 to be peer reviewed and be reliable, and not every specific
16 application. Here is a specific application --

17 THE COURT: Not the conclusions at all; it's just the
18 methodology.

19 MR. PAGE: Right. We can all disagree about the
20 conclusions. In fact, you may think Dr. Harwood's conclusions
21 are wrong or even flawed.

22 THE COURT: Irrelevant, I agree.

23 MR. PAGE: So I think that's important, and I think
24 it's important that what Dr. Myoda and other researchers have
25 pointed out that this is an established method. So then the

1 question is, then, was it properly applied. Was the method
2 reliably applied. And here again, we don't have any evidence
3 except for Dr. Myoda's rebuttal report concerning
4 unreliability.

5 In fact, the peer-reviewed articles develop the
6 biomarker application in the same way as Dr. Harwood did with
7 North Wind labs.

8 It was found to amplify in poultry. And that's
9 called the sensitivity test, Your Honor. And it doesn't always
10 amplify. Sometimes it does not amplify in the poultry waste
11 because DNA does persist, but it eventually, like any organic
12 material, will decay and change.

13 So it doesn't always amplify, but the sensitivity
14 analysis that Dr. Harwood presented says that it amplifies in
15 89 percent of poultry waste.

16 Now, what that indicates is, is that -- that it has
17 that type of sensitivity which, according to peer-reviewed
18 articles, makes it a valid microbial source-tracking device in
19 a biomarker.

20 What it also indicates is that probably about 11
21 percent of the time, we're having false negatives. False
22 negatives. Not false positives; but false negatives where the
23 bacteria, where the poultry waste could very well have been in
24 that location, but because the biomarker is not amplifying, it
25 is not -- cannot be identified to the biomarker.

1 Now, that deals with sensitivity. And Dr. Harwood
2 deals with that in detail in her Rule 26 report and in her
3 declaration that was attached to our response.

4 The second point of applicability has to do with
5 specificity. We've already talked about that a little bit.
6 And I've already pointed out to the Court that we don't have to
7 test all the species in the watershed, just those that are most
8 likely to add fecal bacteria to the environment. And those
9 analyses were performed by Dr. Harwood.

10 And what we have is we have specificity equaling 93
11 percent. That means in 7 percent of the samples, the biomarker
12 was detected in nonpoultry fecal matter. Now, that relates to
13 one goose in Dr. Harwood's analysis and one duck sample. And
14 in both those samples, Your Honor, the report points out -- and
15 Dr. Macbeth also points that out in the paragraphs you've just
16 admitted -- that the biomarker concentration was very, very
17 low. Very, very low.

18 So whereas when we test poultry litter, we have a
19 high level of the biomarker present by means of a methodology
20 called Q as goes to quantitative PCR. So we can actually
21 determine how much is present.

22 In those two samples, the duck and the goose, the
23 biomarker presence was very, very low so that if you take that
24 sample and do qPCR and look at the melt curve on the qPCR,
25 which is a very specific analysis to determine whether or not

1 the biomarker is present, you can distinguish both by quantity
2 and melt curve the difference between.

3 Now, there was a discussion, Your Honor, that there
4 weren't enough samples taken. And this kind of goes a little
5 bit with Dr. Cowan. And let me just make this point real
6 simple. All of the peer-reviewed articles on biomarker,
7 Dr. Harwood has as many or more samples from other nontarget
8 species.

9 And again, Dr. Harwood identified the species relying
10 on Dr. Teaf's mass balance for fecal bacteria. What were the
11 animals, the sources -- most sources of fecal bacteria? And
12 the largest sources were tested for specificity.

13 There's been some discussion about rice hulls. And
14 my understanding of the record, Your Honor, is that there's
15 been two tests on rice hulls. The defendant tested it and we
16 tested it; that is, the State's experts tested it. We tested
17 rice hulls that were not ever used in a poultry barn, and they
18 did not find the biomarker.

19 The defendants tested -- Dr. Myoda tested rice hulls
20 and found the biomarker. But I examined Dr. Myoda in his
21 deposition. Those rice hulls were collected by a Simmons
22 employee from a poultry barn.

23 Now, there hadn't been poultry sitting on those rice
24 hulls yet, but it wasn't like they took it out of the bag that
25 the rice hulls come in or from the store. The rice hulls had

1 already been put into the poultry barn and collected there by
2 a Simmons employee, not a scientist, and then collected and
3 went to the lawyer's office, the chain of custody, to
4 Dr. Myoda.

5 The obvious is, you know, if you put -- if you're
6 looking at DNA and you put the sample out of where the
7 contamination is all around -- it's not like these are
8 antiseptic places. It's clear that the rice hulls that
9 Dr. Myoda sampled and found the biomarker most likely were
10 contaminated by what was left in the barn and wasn't cleaned
11 out.

12 THE COURT: You're not suggesting that just because
13 it went through a lawyer's office, that's where the chicken was
14 picked up?

15 MR. PAGE: No, Your Honor. I think it's the barn was
16 the problem, not the lawyer's office. Not at all.

17 But the point here is, Your Honor, is that -- and
18 those samples that Dr. Myoda did find it, it was at very low
19 levels in the rice hulls. And he admitted that in his
20 deposition. So he couldn't rule out the potential for cross-
21 contamination and neither can we. So I think that's not a very
22 good example of specificity problems.

23 THE COURT: What about the cow hide?

24 MR. PAGE: Well, I examined Dr. -- well, there's lots
25 of issues with Dr. Myoda's analysis, Your Honor. I asked

1 Dr. Myoda where he got the cow hides from. He wouldn't tell
2 me, he said it was a secret, it was a proprietary client, he
3 couldn't tell me. And I thought about calling you up, Your
4 Honor, but I didn't want to disturb you that day.

5 So I said, so what you're telling me is you can't
6 tell me where the cow hides come from, do you know whether the
7 cow hide had ever been around poultry or do you know if the
8 slaughter house was also a poultry slaughter house along with
9 the cattle.

10 He didn't know the answers to all those questions or
11 would not give me those. So I think the cow hide sample is
12 also to be questioned just on the sample by itself.

13 But there's other issues that I will point out to the
14 Court that create issues with the cow hide.

15 Now, if I may, Your Honor, before I get to Dr. Myoda,
16 finish up a little bit more on the traditional Daubert test
17 before I critique their attack expert.

18 Whether the biomarker can be tested. Well, it can be
19 tested. That's one of the Daubert tests, it can be tested.
20 Dr. Myoda said he tested it. He got different results, and
21 we'll explain why, but it's clearly capable of being tested,
22 and that is one of the Daubert tests. Is it something that
23 goes in the black box or is it something that a scientist can
24 go out and test. And there's no debate, as far as I know, that
25 this biomarker can be tested, so it satisfies that aspect of

1 the biomarker.

2 But more importantly, Your Honor, the biomarker has
3 been tested independently -- and this is where we're going to
4 get the objection from Mr. Todd. But this biomarker was
5 independently tested by Dr. Mike Sadowsky at the University of
6 Minnesota.

7 THE COURT: There we go. Now is the time, Mr. Todd.

8 MR. TODD: Your Honor, I object.

9 MR. PAGE: He was sleeping back there, Your Honor,
10 but I woke him up and told him to object. If I may have one
11 minute to explain.

12 THE COURT: Given that it is a new opinion, correct?

13 MR. PAGE: It's a new test.

14 THE COURT: You're not arguing that I need to
15 reconsider striking the new opinion, are you?

16 MR. PAGE: Well, Dr. Sadowsky's independent test is
17 also discussed by Dr. Harwood in her response to the rebuttal.
18 But if I just --

19 THE COURT: It's new. I mean, there's got to be a
20 cutoff at some point, with all due respect, Mr. Page. We could
21 be supplementing until the middle of trial.

22 MR. PAGE: And it only goes to the Daubert attack,
23 Your Honor. And the point is, is that the defendants brought
24 in a issue about peer review and publication that was submitted
25 after Dr. Harwood's report. And they claim that this is new

1 evidence, this is new, and they claim that relates to the
2 reliability because it's not peer reviewed.

3 The best peer review that you can have on a
4 methodology, scientific, would be have a blind test. And
5 that's what happened. So I think it's probative to the issue
6 of peer review.

7 THE COURT: I've got to draw the line here. The
8 objection is sustained. Go ahead.

9 MR. PAGE: If you'll accept my offer of the proof on
10 the affidavit. It's in the record.

11 THE COURT: You've got Sadowsky in the record.

12 MR. PAGE: Thank you, Your Honor.

13 Your Honor, this issue that the defendants raised
14 concerning the publication, a few observations. What Mr. Todd
15 did not tell you is that we answered and Dr. Harwood answered
16 that she was planning on publishing this work because it's the
17 kind of work she does all the time. And they asked her where,
18 and she told them. And then Dr. Myoda, the defendants' expert,
19 and Mr. Jorgensen's office, wrote about an 11-page, single-
20 spaced letter --

21 THE COURT: I've read the letter.

22 MR. PAGE: -- to the journal.

23 I would suggest that a group of researchers that are
24 unknown, they're not identified, we don't know anything about
25 their credentials to evaluate this, whether they really have

1 developed biomarkers themselves, that are anonymous hearsay, is
2 not valid evidence of the validity of this biomarker.

3 So, Your Honor, I believe that that process was
4 affected by the defendants.

5 THE COURT: Well, they're anonymous. I mean, clearly
6 academicians still have the courage of their training and
7 experience, do they not? I mean, if they don't, we're in
8 serious trouble in this country. I mean, why should they pay
9 any attention to a bought-and-paid-for lawyer? Surely --
10 they're anonymous. They can do what they think is right, can't
11 they? That's what academic integrity and independence is all
12 about.

13 MR. PAGE: Well, I don't know what was in the mind of
14 those folks.

15 THE COURT: I don't either.

16 MR. PAGE: But I do know this. I can comment about
17 coincidences. And some of the same issues that were raised by
18 Mr. Myoda and the lawyers are some of the same issues that the
19 researchers evaluated. But the most important --

20 THE COURT: I tried to -- because that was one of the
21 concerns I had. I mean, clearly they didn't parrot the words.

22 MR. PAGE: No, they didn't parrot the words. I think
23 probably a scientist would probably be capable of not doing
24 that. But, Your Honor, I think the key aspect of that
25 publication issue is that the reviewer's key problem and key

1 issue on publication -- I mean, they raised little things, and
2 a lot of things are little things, at least from the
3 perspective of the scientists -- but the key issue was they
4 weren't sure whether the biomarker would have general
5 scientific applicability beyond the IRW. And that was their
6 concern. This may be --

7 THE COURT: You think that was the key concern?

8 MR. PAGE: Yes, Your Honor. Yes.

9 THE COURT: It certainly was a concern.

10 MR. PAGE: I think that was the key concern, based on
11 the comments that I read in reviewing them. Of course -- and
12 this is all not part of the record, but Dr. Harwood has now
13 gone and developed more information because she thinks this is
14 important scientific analysis, that it's valid. So she's gone
15 out and done some more sampling on her own, and she's added
16 those samples and she submitted another paper.

17 But she believed -- her view was is that the issue
18 was whether or not it would have general applicability to the
19 scientific community beyond simply the IRW.

20 So I believe, Your Honor, that if you're going to
21 accept an anonymous hearsay report from scientists that we
22 don't know what their credentials are, on the one hand, to say
23 this isn't a valid reliable --

24 THE COURT: It's fairly reliable hearsay, is it not?
25 I mean, anonymous peer review. I don't know that anybody has

1 given me any authority for that, but in terms of the catchall
2 for reliability and hearsay, clearly that's pretty reliable; is
3 it not?

4 MR. PAGE: No, Your Honor, because I believe that we
5 don't know who these people are. We don't know their
6 credentials. This journal publishes on many topics beyond
7 biomarkers and microbial source tracking. So what I would say
8 to you, Your Honor, and look at reliability, on the one hand,
9 you have a -- frankly, a well-established blind test that the
10 Court has rejected. On the other hand, you have anonymous
11 folks who you don't know what their credentials are, and you
12 accept that.

13 THE COURT: But your expert submitted the paper to
14 this journal. Presumably, it's a reputable journal.

15 MR. PAGE: It is. It is.

16 THE COURT: Also, presumably, its testers -- I mean,
17 Ms. Harwood is one of the peer reviewers, right?

18 MR. PAGE: Right.

19 THE COURT: Or is she an editor? Is there a
20 distinction?

21 MR. PAGE: I think they're about the same. I think
22 the editors are peer reviewers also.

23 THE COURT: Maybe; maybe not. But in any event,
24 she's affiliated with it.

25 MR. PAGE: That's correct.

1 THE COURT: It's a respected journal.

2 MR. PAGE: Yes. And about 85 percent of the papers
3 that are submitted are rejected for various means and different
4 reasons.

5 I think, Your Honor, that that is not as valid
6 evidence of peer review as where you have Dr. Sadowsky doing an
7 analysis -- clearly was after Dr. Harwood's report, but, you
8 know, Your Honor, we undertook the analysis even before we knew
9 that this Court was going to take out Dr. Harwood's paper
10 because that preliminary injunction order came down in
11 September. The report of Harwood was submitted in May.

12 I think what is most important is, is that
13 Dr. Harwood explained in the deposition, her deposition, who
14 Dr. Sadowsky was and what he was doing. And although I'm not
15 sure I agree with Mr. Todd when he says that it's typical to
16 take consulting experts.

17 The defendants have asked to take two consulting
18 experts, and we agreed. We gave them -- when they specifically
19 asked, wrote or called me and said, we want to take Macbeth and
20 the other one was a Dr. Jones, a limnologist, we offered them
21 up in Tulsa, and they took their depositions.

22 So, you know, I agree that it was a later report, but
23 there was a lot of work continuing done on the science in this
24 case beyond when it stopped -- scientists continued to do their
25 analysis and their work, in any event. So I'm just suggesting

1 to the Court that there's different kinds of peer review and
2 this was appropriate.

3 Let me just go on, Your Honor, to point out some
4 issues with regard to Dr. Myoda. And Dr. Macbeth outlines that
5 in her declaration in the paragraphs that go toward the end of
6 her declaration -- I don't have those right in front of me. I
7 think it's beginning at about paragraph 14 through 24 -- about
8 Dr. Myoda's issues. And there are many.

9 And so that when he claims that cow hide and rice
10 hulls unused -- we talk about the sampling problems. There are
11 other problems with the way he did his tests that indicate his
12 specificity challenge are unreliable. And let me just briefly
13 list those for the Court.

14 He did not -- and I attached his deposition -- I did
15 attach his deposition. He didn't follow the explicit
16 protocols. When you do this biomarker work, there are
17 protocols that you must follow in order to make sure the primer
18 properly amplifies the DNA sequence. And he was not aware of
19 the protocols. He did not do the work himself. Another lab
20 person did the work. And he wasn't sure and couldn't vouch
21 that the protocols were followed. And his expert report does
22 not vouch that the same protocols were followed, as North Wind
23 did for Dr. Harwood in his lab, IEH.

24 Importantly, two critical protocols that were not
25 followed, as far as his testimony indicates, were negative and

1 positive controls. When you go to test something, Your Honor,
2 you want to have a negative control; that is, you have -- you
3 run -- right next to your biomarker to see if it amplifies, you
4 run an empty petri dish, so to speak. They didn't run a
5 negative control.

6 Now why would that be important? Typically it's
7 standard protocol, but in this case, it's very important. For
8 some reason that's not based on the science for library-
9 independent PCR, they went ahead and cultured or tried to
10 culture this *brevibacterium*. Dr. Harwood says that's not
11 necessary. In fact, that's one of the elegant aspects, that
12 you don't have to culture the specific bacteria to identify it
13 because you're looking at specific DNA.

14 They went ahead and cultured it in their lab. 20 to
15 30 feet from where they're culturing the bacteria, they're
16 extracting the DNA for PCR. There's all kinds of opportunity
17 for contamination in Dr. Myoda's lab. And at trial, you will
18 hear quite a bit of cross-examination on that point,
19 Your Honor, from me.

20 That is a critical problem with his analysis. There
21 is all kind of opportunity for cross-contamination because he
22 was culturing in the same room he's extracting his DNA. This
23 is very little -- very small specks of stuff that can
24 contaminate. And then he didn't run a negative control to make
25 sure he didn't have cross-contamination.

1 So all of these times when he said, gee, we found
2 biomarker in goose, we found it on cow hides, we find it
3 everywhere, well, it's because it was everywhere; it was in his
4 lab everywhere because he had cross-contamination most likely,
5 and he can't prove he didn't cross-contaminate because he
6 doesn't have any negative controls.

7 THE COURT: You raise a point here. The defendants
8 contend that Harwood failed to utilize controls. Your
9 response?

10 MR. PAGE: Dr. Macbeth clearly points out that all
11 the controls were properly followed in detail, and Dr. Harwood
12 said also in her report.

13 The record is clear that Dr. Myoda didn't know what
14 the controls were and that he couldn't vouch for them.

15 You also need a positive control, Your Honor. You
16 have to have a positive biomarker so you know for sure that's
17 what the image looks like when you amplify it or you put it in
18 the melt curve. So then you compare your result for your test
19 like looking at two pictures side by side; is this the same
20 thing or not.

21 He didn't have positive controls when he was doing
22 his analysis. So when he said -- when he made his opinion that
23 that was the biomarker or not, when you look at the slide, he
24 didn't have a positive control run with that slide, so he was
25 simply guessing that it was amplified.

1 THE COURT: What about the melt curve criticism that
2 Dr. Harwood wished to -- wished not to mention some aspect of
3 the melt curve issue?

4 MR. PAGE: No. The action of the melt curve is the
5 qPCR analysis, Your Honor, and that's very important. It
6 allows for the specificity to be confirmed. And so you look at
7 the melt curve to make sure that the curve for your known
8 species of biomarker where you have your positive control
9 either matches or doesn't match the other sample you're
10 evaluating. And that was the melt curve analysis, and the
11 positive control was run on all the samples, both for
12 sensitivity and specificity very carefully by North Wind.

13 North Wind was selected as a lab because Dr. Harwood
14 was busy on other projects in her lab. She could do this in
15 her lab, and she does. North Wind was available. They're used
16 to doing this work. Dr. Macbeth and Weidhaas do it all the
17 time. And it was a good fit for the case for them to do this.
18 They're very familiar with this methodology.

19 THE COURT: We've got two other motions in connection
20 with this one that we need to decide contemporaneously. I
21 think I stated the wrong number. I think it's 2090, not 2099.

22 MR. PAGE: I'll finish.

23 THE COURT: And in the motion with regard to Cowan
24 2072.

25 MR. PAGE: There's going to be -- what I would like

1 to do, Your Honor, is I think I've told you about Cowan. I
2 think that his statistical analysis as it goes to Harwood, then
3 we'll talk about him and Olsen later, if we may. We can take
4 them up with Olsen.

5 But with Harwood, it's very simple. He's never done
6 any bacterial analysis, statistical analysis of microbial
7 source testing. His criticisms aren't applicable to this
8 science. He's never been involved in a bacterial or microbial
9 source-tracking case, so he doesn't understand the statistical
10 principles.

11 Fundamentally, Dr. Harwood took the number of samples
12 that were taken in other peer-reviewed articles for biomarkers,
13 as many or more in these other biomarker development. So the
14 issues that Dr. Cowan raises are not applicable to microbial
15 source tracking.

16 THE COURT: You yourself admitted there can be false
17 positives and false negatives. I mean, isn't that essentially
18 the necessity to have a statistician look at this and say,
19 look, you need a bigger sample?

20 MR. PAGE: Well, the statistician isn't the best
21 person to decide how many samples are needed. The
22 microbiologist --

23 THE COURT: He's not trying to decide how many you
24 need; he's just saying you have far too few.

25 MR. PAGE: Well, I think that's another way of saying

1 the same thing, Your Honor, in my opinion.

2 THE COURT: All right.

3 MR. PAGE: The microbial source-tracking literature
4 in the guidance shows the number of samples used by Harwood is
5 a proper validation technique. So Dr. Cowan's criticism is
6 based on, I think, his work in social sciences. He's a
7 demographer. He does social science work, sometimes he does
8 valuation work -- but he's never worked valuation work, but
9 he's never done an environmental case. So his criticisms
10 aren't applicable. It would be, I guess, like me trying to
11 criticize a baseball player, a professional baseball player,
12 where he does his proper swing. And I've played softball in my
13 life, so I'm saying, you know, that's not how I do my swing.
14 So that's probably not -- so he's not -- the professional
15 baseball player is not making his swing right.

16 Well, he doesn't understand the science. He's never
17 published in this area. He's never done an analysis in this
18 area. So his criticisms certainly don't undermine the
19 reliability.

20 Now, if it's subject to some kind of cross-
21 examination, maybe so; but it doesn't go to a Daubert challenge
22 or basis when you have peer-reviewed articles, use the same
23 amount of samples, the same number of other sources that
24 establish biomarkers for other species that are available to
25 the Court.

1 THE COURT: What about hold time?

2 MR. PAGE: Well, that wasn't going to be in my
3 argument, but I can give you a quicky.

4 THE COURT: Is someone else going to --

5 MR, BULLOCK: I was going to do that, Judge.

6 THE COURT: We're at 5:00, and I at least would like
7 to decide more than one motion here today. So we're going to
8 go until we decide them.

9 MR. PAGE: Thank you, Your Honor.

10 THE COURT: Yes, sir. Mr. Bullock, you care to --

11 MR, BULLOCK: I'm defending, but I'll be happy to
12 present their side, too.

13 THE COURT: Sure. Who's going to handle hold time?

14 MR. JORGENSEN: I can do hold time quite quickly. I
15 think Mr. Todd had no more than five minutes in rebuttal --

16 MR. BULLOCK: Between Jay and I, we'll get hold times
17 knocked out here quicker than you can say.

18 THE COURT: Mr. Todd.

19 MR. TODD: Your Honor, I will do my darndest to be
20 quick without killing the court reporter.

21 First, on the scope of the challenge, Your Honor, I
22 think I can deal with this quickly. Section C of our motion,
23 starting on page 22, clearly goes to Dr. Harwood's health
24 testimony and health effects, health risks in the IRW
25 generally. That's the non-PCR specific portion of her report.

1 So we put that in play.

2 Mr. Page referred, and you took him through
3 Dr. Harwood's report, and he referred to the many pages that
4 discussed health effects generally.

5 I would direct Your Honor to pages 8 and 9 first of
6 her report where she discusses the conclusions that she reaches
7 from that testimony. And you will see there is nothing
8 specific to the IRW. It's just general testimony about
9 bacteria and diseases related to those bacteria. I would also
10 direct you to page 11.

11 THE COURT: All right. They're suggesting, although
12 I didn't know that this was an issue today, that she ought to
13 be allowed to testify to those general matters.

14 MR. TODD: And the question, Your Honor, is whether
15 -- first the question is whether she can testify specifically
16 to the IRW. Her conclusion, the crux of her testimony is that
17 bacteria from poultry litter create a health risk in the
18 Illinois River Watershed. There's nothing here in her
19 conclusions on 8 and 9 to talk specifically about the IRW.

20 Same thing on page 11, where she states her
21 conclusions about water quality testing and a relationship to
22 public health. It's all general.

23 So the question, then, is whether her testimony is
24 relevant to the case to talk about general health risks when
25 there's no hook, no link to the IRW; and at that point, it's an

1 evidentiary issue. And we argue, A, it's irrelevant and, B,
2 it's unduly prejudicial to the defendants without some hook to
3 the IRW.

4 Interestingly, Mr. Page points you to page 15 -- I'm
5 sorry, 14 where she starts talking about the biomarker. And
6 the title of this section, section 5, is Specific Evidence of
7 Poultry Fecal Contamination in the IRW. That's where she
8 starts in on the biomarker. Everything before that is
9 prelude. It's a windup to the biomarker which then links it to
10 the IRW. Without that, Your Honor, she has no link. So that's
11 our position on what's in play.

12 Moving on. Mr. Page talked at some length about the
13 pedigree for the biomarker process and talked about
14 Dr. Harwood's affidavit, and now we're talking about the
15 Macbeth affidavit as well. He threw out a number of authors
16 and a number of scientists. But if Your Honor goes and looks
17 at the articles that were referenced, you'll find that
18 certainly none of them find a poultry-specific biomarker. None
19 of them validate the methodology that was applied in this
20 case. None of them peer review it.

21 If you recall from the PI testimony, Your Honor,
22 there was a lot of discussion about microbial source tracking
23 as a field. It's relatively young. It's about 15 years old.
24 It's not that much older now than it was then. And
25 Dr. Harwood, in her testimony and in her writings, admitted --

1 and she's written an article to this effect, that for most of
2 that time, the field was characterized by unwarranted
3 enthusiasm. People thought their methodologies were accurate,
4 but then they were subjected to blind testing, truly
5 independent blind testing, and it was discovered they were not,
6 for a lot of the reasons we've put in play in this case.

7 The plaintiffs pointed to Kate Field's work, and
8 that's actually a microcosm of what's wrong with Dr. Harwood's
9 testing. Dr. Fields started out a decade ago with what she
10 thought, with what she hoped was a cattle marker. And she's
11 tested it in a ton of watersheds. She's done a ton of
12 sampling. She's looked at all the type of bacterial fate and
13 transport characteristics that we've raised. And at the end of
14 the day, she found that it's no more specific than ruminants
15 generally after extensive testing where she sent her colleagues
16 at other universities, and they've looked at it as well.
17 That's a heck of a lot more substantive than what's been done
18 in this case.

19 So we would argue, Your Honor, the pedigree is not
20 there to support this as anything other than a novel method
21 created for this case.

22 Let me talk a little bit about Dr. Myoda,
23 Your Honor. I feel like Dr. Myoda is getting a bit of a bum
24 rap here because there was no Daubert motion filed to him and
25 so, therefore, he's not had an opportunity to put in a

1 declaration in defending his work. So we don't have the
2 benefit of that. For example, he could testify -- he could
3 explain the positive and the negative controls. He did some of
4 that at his deposition. And he could testify why he thinks
5 it's important to culture something at the time you're
6 developing the methodology; and certainly when you're applying
7 an assay like this years later when it's been proven, you don't
8 have to culture the bacteria -- that is its utility. But at
9 the time you're developing it, certainly you have to culture it
10 to know what its fate and transport characteristics are.

11 Mr. Page and some -- and Dr. Macbeth have speculated
12 as to the potential for cross-contamination here, but that's
13 all that is, Your Honor: Speculation. Mr. Page had Dr. Myoda
14 draw a schematic of his lab from memory at the deposition; and
15 based on that, we're getting this speculation of
16 contamination.

17 The only admission of contamination in this case,
18 Your Honor, is at North Wind. That's how they got rid of the
19 initial positive hit they got on a cow sample. When they were
20 first were developing their method, they had a cow sample that
21 came back positive, and they said, oh, that couldn't have been
22 positive because that must have been contaminated. So we do
23 have some contamination, Your Honor; it's not with us.

24 The next thing I want to touch on is the letter --
25 I'm sorry, the letter that we wrote to the journal and the

1 whole commentary about the peer reviews.

2 Your Honor was entirely correct. Dr. Harwood
3 selected this journal, not us. She's a member of this
4 journal. She peer reviews for them. She's known to them. In
5 fact, she explained at her deposition how the practice is that
6 when you submit an article, you also submit the names of
7 recommended peer reviewers. You say who's in your field.
8 That's something we asked her for, and she couldn't give us at
9 first, then we went back and forth with the other side trying
10 to get it. And they finally gave us those names.

11 We don't know if those folks actually were the peer
12 reviewers, but we understand that quite often those people are
13 the peer reviewers. Perhaps they were; perhaps they weren't.
14 But if Mr. Page's criticisms of peer reviewers, anonymous peer
15 reviewers are to be taken and credited, then I suggest that all
16 the peer-reviewed articles that Mr. Page has repeatedly cited
17 to could also be tossed out. We don't know anything about them
18 either. So I think that criticism should be laid by the
19 wayside.

20 Your Honor has reviewed the peer-reviewed materials,
21 the peer reviewers criticisms; they echo our criticisms. I
22 should make this point. If you read those comments, the
23 detailed comments that peer reviewers gave, there is not a
24 shred of evidence in there that they saw the materials we
25 gave. This is not scientific, I grant you, but we polled the

1 experts on our case to say: If you all work with the journals,
2 what would you do if you got these kind of materials? And
3 unanimously they said: As an editor, I would sit on them. I
4 would want to know what the peer reviewers thought
5 independently of the work that was submitted to them and then
6 I'd consider the work myself. There's no evidence the peer
7 reviewers saw anything that we sent in, Your Honor.

8 THE COURT: That would be the right way to do it. We
9 just don't know how the editor dealt with it.

10 MR. TODD: That's exactly right, Your Honor. We
11 simply don't know. What we do know is that the peer reviewers,
12 for whatever reason, came back with many of the same criticisms
13 and concerns that we had with Dr. Harwood's methodology.

14 The final thing I would say on the melt curve issue,
15 Your Honor, in the -- we've gone back and forth as to how
16 specific these things are and whether -- the issue in the brief
17 is whether a melt curve can identify a specific DNA strand.

18 In the plaintiffs brief on pages 5 and 6, I think it
19 is, they cite to an EPA guidance, a QA/QC guidance, a document
20 for the use of PCR, and that document specifically states that
21 melt curves are not specific to a specific strand of DNA, that
22 different strands of DNA can have the same melt curve. That's
23 borne out by the testimony we put in from Dr. Macbeth's
24 deposition and Dr. Myoda's report as well. So it's not at all
25 proof that this thing is specific to poultry.

1 If Your Honor has further questions, I'm be happy to
2 field them, otherwise we --

3 THE COURT: What about Mr. Page's statement that all
4 the plaintiffs are attempting to do here with the Harwood
5 testimony is trying to show that poultry waste is moving
6 through the environment and getting to the locations at which
7 the biomarker shows up?

8 MR. TODD: I'm glad Your Honor asked that. I had
9 some thoughts on that, and I missed it. This was the dye
10 marker analogy, and --

11 THE COURT: Yes.

12 MR. TODD: -- it's an interesting one. The problems
13 are -- there's a number of problems. First, what it shows you
14 is where water goes, to the extent that water is carrying this
15 biomarker. It doesn't tell you where the biomarker came from.
16 And we believe we've demonstrated that this thing, this DNA
17 strand, can come from things other than chickens. It doesn't
18 tell you that.

19 It also, as Your Honor raised, the fate and transport
20 issues. It's not just the biomarker. Even if we assume, for
21 argument sake, that this thing does come from chickens and it's
22 carried by water into other places in the IRW, it's not at all
23 proof that indicator bacteria in that same location came from
24 chickens 50 miles upstream as opposed to a cattle field or
25 cattle bathing in the river a mile upstream, and it doesn't

1 tell you that there are pathogens also there indicated by those
2 indicator bacteria that came from poultry.

3 So it's a very limited utility at the most, I would
4 say, Your Honor.

5 I forgot to respond to one thing at the very end on
6 Dr. Cowan, if I may. I enjoyed Mr. Page's analogy to a
7 baseball player. Dr. Cowan would not -- I don't know if he
8 plays baseball, but if he can't comment on the actual playing
9 of baseball, he certainly could comment on the validity of any
10 statistics drawn from the baseball player's conduct. He
11 doesn't need to know the science, Your Honor. He can testify
12 to the statistics. Thank you.

13 THE COURT: Mr. Jorgensen.

14 MR. JORGENSEN: Thank you, Your Honor. I'll try to
15 be very brief. Jay Jorgensen for the defense. Your Honor,
16 you've heard a lot of evidence already in this case, so much
17 you might be getting sick of it, about bacteria and indicator
18 bacteria. You know obviously that plaintiffs took a number of
19 samples and they tested them, and they tested them to enumerate
20 the bacteria. "Enumerate," meaning what types of bacteria are
21 in this water and how many of them are there.

22 So the question is: Why? Why do that? And again,
23 you've already heard. The reason why is so that Dr. Teaf can
24 testify that there are standards put out by the EPA that say
25 how many of what type of bacteria can be in water. You've

1 heard a lot about these water quality standards. I was going
2 to cover them today, but I'll just skip that part.

3 So the question is: If Dr. Teaf is going to testify
4 about EPA has got a standard, a health standard for how many
5 bacteria can be in this water, do you have to follow EPA's
6 rules for entering that testimony? And you've seen here on the
7 page, on the court projection system, the first indication of
8 what EPA said.

9 Can you bring up the specific language, Mr. George?

10 So EPA has said if you're going to do this, if you're
11 going to test surface water to say what's the number of
12 bacteria that are in this surface water, there's a way you have
13 to do it. And one of the -- the requirements is the holding
14 time. The holding time is after you scoop up the water, how
15 long you keep it before you test it. And it's obvious as to
16 why that matters.

17 THE COURT: Let me ask just a procedural question
18 before we get into the substance here. This strikes me as a
19 belt-and-suspenders approach. You're seeking to exclude the
20 testimony of Drs. Olsen and Harwood and Teaf. And you filed
21 this as an alternative motion, perhaps in the hope that if this
22 were granted, then it would force a certain decision with
23 regard to the others.

24 Why shouldn't I just consider this as a factor in
25 connection with Olsen, Harwood and Teaf? And why should I

1 consider it as a completely separate motion?

2 MR. JORGENSEN: No, you could consider them together,
3 Your Honor. You're exactly right. And part of the problem
4 that we had on the defense side is there are several things
5 wrong with what Dr. Harwood has done. And this is one of the
6 more clear and more clean-cut ones, but you're exactly right.
7 If you say Dr. Harwood can't testify in this case, then there's
8 no evidence that any bacteria that is swimming in any water
9 came from poultry litter, and the case is now about phosphorus,
10 not bacteria. All the bacteria testimony is out and the case
11 is just about phosphorus. You're exactly right there; there
12 would then be no need to decide this.

13 THE COURT: Go ahead.

14 MR. JORGENSEN: So you'll see there on the screen
15 that EPA says maximum holding time. I think I was saying the
16 reason that there is a holding time is as we have water, we
17 scoop it up and we hold it in a container; in the first
18 instance, the first moment, what's in the cup matches what's in
19 the surface water, in the pool you just scooped. But six hours
20 later, ten hours later, a day later, what's in the cup no
21 longer matches what's in the water. It becomes invalid and
22 unreliable.

23 So there, you'll see listed on EPA's chart the very
24 kind of bacteria that plaintiffs tested for here, coliform,
25 total coliform, fecal coliform, enterococci, salmonella, six

1 hours; you see that on the right side.

2 There's a little footnote there, footnote 4. And in
3 an EPA kind of way, there's a lot of text behind footnote 4.
4 But what does footnote 4 say? I'm going to try to excerpt for
5 you. Let's go to the next slide. So we won't try to read
6 everything that's there on the left; it's a government
7 document. But here's some key stuff. "Samples should be
8 analyzed as soon as possible after collection. The times
9 listed are the maximum times that samples may be held before
10 the start of analysis and still be considered valid."

11 The point here being that EPA has determined after
12 all the years and decades that it's been doing surface water
13 standards, the very standards Dr. Teaf and others want to
14 testify about here and say were violated, that after you've
15 held water that you scooped up out of a pond, out of a lake,
16 out of a river for more than six hours, it no longer looks like
17 what's in the pond, the lake, the river in terms of bacteria.
18 So six hours is the max.

19 Let's go to the next slide. "Some samples may not be
20 stable for the maximum time period given in the table. A
21 permittee or monitoring laboratory..." And the reason they
22 refer to that is, of course, the states, other jurisdictions
23 are required to test, as Your Honor has already heard about,
24 surface waters to comply with EPA standards. So it's saying as
25 you are complying with our standards, you're obligated to hold

1 the sample for a shorter time if you know a shorter time is
2 necessary to maintain sample stability. So six hours is a hard
3 line.

4 Let's go to the next page.

5 Sometimes there's doubt about what EPA says, what EPA
6 means when it says something, but here there is no doubt. Here
7 we've got the publication from the EPA. "Improved enumeration
8 methods for the recreational water quality indicators."

9 Again, you've heard a lot about recreational water
10 quality indicators and had a bit of a dialogue with Mr. Todd
11 about it. This is from 2000. When it's talking about improved
12 enumeration methods, EPA came up with a test that you could
13 conduct a little bit faster in the lab, and that's what it's
14 talking about. It's talking about the improved enumeration
15 methods.

16 But it says what the purpose of this manual is. It
17 gives specific step-by-step instructions that are to be used if
18 you're going to enumerate the bacteria that are in surface
19 water, as the plaintiffs have tried to do in this case. And it
20 says, "Samples should be collected in sterile containers," that
21 makes sense -- "and stored on ice until analyzed." Let's pause
22 there.

23 You're going to hear from the plaintiffs that they
24 stored these samples on ice, that the samples were cold and,
25 therefore, these hold times don't matter, because if they were

1 cold, then stuff didn't grow. EPA considered that. We don't
2 have time to go completely through the footnote 4 which is
3 submitted in the records of the court, but it talks in there
4 about cold and the specific temperature at which bacteria have
5 to be kept. So cold is not an exception to the hold times.
6 Bacteria still grow. Bacteria still die. And as you've heard
7 from Dr. Harwood, they grow and die differently. Some grow
8 when it's cold and some die. Some grow when it's warmer; some
9 die. So, again, your sample changes.

10 "Samples should not be held longer than six hours
11 prior to analysis, and analyses should be completed within
12 eight hours after collection of the samples."

13 Let's go to the next slide. "Adherence to sample
14 preservation procedures and holding time limits is critical to
15 the production of valid results." This is the key. "Samples
16 must not be analyzed if these conditions are not met."

17 So I don't think EPA could have been more clear. The
18 question is: Did the message get across? I realize I'm moving
19 fast, Your Honor, but feel free to interrupt me if you have any
20 questions.

21 THE COURT: You're doing fine.

22 MR. JORGENSEN: So here's ODEQ. As you might
23 imagine, the State of Oklahoma, which needs to comply with
24 these EPA surface water standards which test for them, and
25 you've heard some of their testing today, that you can imagine

1 that they have their own lab, which they do, the State has a
2 lab, and that they put out standards for the lab.

3 So here's ODEQ's 2009 quality assurance plan from
4 their lab. And it says, "Samples should be delivered to the
5 laboratory as soon as possible after collection." Now, again,
6 I haven't excerpted everything, but we're talking here, again,
7 about surface water samples from lakes, streams and ponds that
8 are being enumerated for bacteria.

9 "Timely delivery is important as many samples are
10 stable only for a short period of time following collection."

11 Let's go to the next slide. "The technical holding
12 times listed in the following tables are the maximum," again,
13 there it is, "lengths of time that samples may be held from the
14 time of collection to the time of analysis and still be
15 considered valid."

16 Then let's see their chart. You're not surprised
17 that their chart matches up with EPA's chart. Six hours. Six
18 hours for fecal coliforms. Six hours for enterococcus. Six
19 hours for salmonella. Six hours for shigella. Some of the
20 very bacteria that are talked about here.

21 So I'm not going to go on, Your Honor, there are more
22 slides, but I'm just going to cut it off there. You see in the
23 briefing that the USGS has the same standards. These are the
24 standards.

25 The other thing you'll hear from plaintiffs, because

1 you see it in their response, is this only favors us; these
2 bacteria are dying over time, and so this ought to be
3 overlooked because to the extent that the bacteria numbers are
4 off, they're off in a way that favors the defendants.

5 THE COURT: Depends on environment, temperature,
6 etcetera.

7 MR. JORGENSEN: Exactly. Anybody who's packed a cold
8 lunch in a ice box knows that your corn dogs gets frozen and
9 your beer gets warm. And we have, in some of the evidence
10 that's been submitted to you, samples of when the laboratories
11 in this case received materials, they didn't note whether it
12 was cold or they noted a problem with whether it's been cold.
13 You just can't rely on that. You can't assume that it's always
14 going to favor us that the salmonella weren't growing, why the
15 E. coli were dying or whatever. That's why EPA, after all of
16 its experience, laid down a maximum.

17 So let me just consult my notes because I skipped a
18 lot of stuff. You'll see on page 6 of our motion that
19 Dr. Olsen admitted this in his deposition, but then when
20 confronted with the fact that they did not in this case meet
21 the hold times, came up with his own theory that other people
22 outside EPA, outside of ODEQ, have come up with other hold
23 times.

24 You see attached in some of the materials to
25 plaintiffs' response some articles, some other people

1 commenting that they were able to keep their samples stable,
2 you know, to produce valid results with longer hold times. And
3 24 hours has floated by the plaintiffs as an alternate
4 standard.

5 Let me say two things with regard to that. First,
6 this isn't an issue that comes up in a vacuum. Your Honor
7 knows, because you've already heard the testimony, you've had a
8 preview of it, that the testimony that plaintiffs are
9 proffering or attempting to proffer from this stand is that EPA
10 has a standard, the EPA standard protects human health, and
11 that EPA standard has been violated, and that it's our fault.

12 In that context, how you can say, I'm going to use
13 somebody else's hold time and not EPA's maximum hold time, I
14 just don't know.

15 And then the second is, even if you were go with
16 their alternate standard 24 hours, a huge number of their
17 samples fall out. They mailed these things to California. And
18 they should have set up a local lab, used ODEQ's -- Oklahoma is
19 the plaintiff here. They have a lab. You've just seen the
20 lab's procedures. There was no need to ship these samples all
21 over the country. Thank you, Your Honor.

22 THE COURT: Thank you very much. Mr. Bullock, do we
23 have declarations that have been stricken that bear upon this?

24 MR. BULLOCK: I don't believe that Dr. Harwood's
25 declaration in response to this has been stricken nor do I

1 think that it should be.

2 But let me explain so that the Court is clear. First
3 of all, absolutely essential everyone understands this, our
4 case in terms of risk to human health does not solely reside on
5 the samples that are before the Court here. Quite the
6 contrary. ODEQ has done ample sampling. The risk to human
7 health to primary body contact which has been declared by the
8 State and declared repeatedly based on -- is based upon a whole
9 different data stream which goes unchallenged.

10 And so to the extent that the Court suggests that if
11 this motion is granted, the issues of human health raised by
12 Drs. Harwood and Teaf and other evidence that we will have does
13 not go away. This is fill-in evidence. This is additional
14 evidence. This is some evidence of the movement of some of
15 these contaminants through the IRW, but it is not the
16 essentials of what we rely on for risk to human health.

17 Now, you have heard what I think is an excellent
18 lawyer's argument. I think Jay Jorgensen -- Mr. Jorgensen can
19 probably present to the Court as good of a scientific argument
20 as a lawyer can present. But what they lack is any scientific
21 analysis, scientific opinion to support this argument.

22 Now, what he points to with great vehemence are the
23 standards established by EPA for compliance moves; that is, if
24 you're going to shut down a place because of an issue of
25 compliance with the water quality standards, they say six-hour

1 hold times are a bright line.

2 But insofar as the question of whether or not this
3 data is usable, probative and helpful for the use to which we
4 have put it here, they have no evidence of that. And, in fact,
5 I must suggest that, in fact, what they are doing is telling
6 the Court only half of the story, and the half relates solely
7 to the issue of compliance.

8 Let me quote from and call the Court's attention
9 to -- it's Exhibit 7 of their report, and it's a national -- or
10 their objection, it's a national field manual for collection of
11 water quality data by USGS.

12 And I'm quoting here from 7.1.2.D. It is identified
13 up at the top as FIB-37. What the USGS says is "Adhering to
14 holding times minimizes changes in the density of indicator
15 bacteria." No one will disagree with that. But then the USGS
16 goes on. "However, for noncompliance, ambient monitoring,"
17 which is what we are putting before the Court here, "a longer
18 holding time may be used as long as it is consistently
19 maintained and documented." And they cite to, as Dr. Harwood
20 and others cite to, Pope and others, 2003.

21 Then they go on, and this is the third bullet point
22 down on that page. "For other types of water" -- other types
23 of water, they talk about before this, both drinking water and
24 nonpotable water. It says, "For other types of water for
25 noncompliance purposes again, samples should be analyzed within

1 24 hours of collection."

2 Now, you and I may read these things and say, well, I
3 understand that. The question is: How do scientists
4 understand that? Does the world drop dead in the 25th hour?
5 Is the reference to this sample that they recommend should be
6 examined in 24 hours, does any of its probative value end?

7 These documents don't stand for that proposition.
8 These documents stand for one limited purpose: The six hours
9 is a bright line for compliance purposes, and the USGS says if
10 you're going longer than 24 hours, you need to keep track of
11 that. And it needs to be examined -- the implication of this
12 is you need an expert to tell you what the probative value of
13 that data is.

14 Now, Dr. Harwood has offered her declaration that
15 this issue was thought of, it was considered, and she is of an
16 expert opinion that this data is probative for the purpose for
17 which it's used.

18 Defendants have nothing to support their lawyer-
19 driven concept that this data is worthless because it goes
20 beyond six hours, it's of no probative value because the hold
21 times were beyond six hours. That is not the science, and
22 their lawyer-driven arguments should be rejected by the Court.

23 THE COURT: These were sent to California; some were
24 over 24 hours, obviously.

25 MR. BULLOCK: Right.

1 THE COURT: Apparently, it routinely took more than
2 20 hours, correct?

3 MR. BULLOCK: That's not the way I read the data,
4 Judge. But it's in the brief.

5 THE COURT: Is there a mean time calculated?

6 MR. BULLOCK: No. The way that it's set out in our
7 brief -- and I'll pull that up -- is you'll find the chart on
8 page 6 of our brief where it gives the numbers and you can
9 figure the percentages. In fact, for instance, on CDM river
10 samples, 84 were under 24 hours, 61 were between 24 and 30
11 hours. And you go on across the chart.

12 Now, some of these are longer when you get down to
13 the greater than 48 hours you can see, but that's a small
14 number.

15 The question truly is -- and I don't make light of
16 this -- is when a scientist looks at this, the question is:
17 Does the scientist say that this data is not reliable for the
18 purposes to which it's being put?

19 You and I might question it, but the only scientist
20 who has opined on that says that, no, this data is probative
21 for the uses to which we've put it.

22 THE COURT: So specifically spell out to me why the
23 use for which it's put is not biased one way or the other as a
24 result of the hold time issue.

25 MR. BULLOCK: The first part of it is that

1 overwhelmingly, contrary to what's been suggested here, is that
2 the bacteria will die off. There's a very low incidence of any
3 growth in bacteria.

4 And, in fact, if the Court will recall, during the
5 PI, we had a great deal of testimony about what a harsh
6 environment, how once these enteric bacterium move out of the
7 body, how they die off, how it's so tough for them, how they
8 like the warmth of intestines rather than the harsh
9 environment.

10 And here, contrary to what Mr. Jorgensen says, they
11 haven't even argued in their brief that these were -- arrived
12 warm at the lab. All of the -- in their -- the data supports
13 the view that, in fact, they were handled properly.

14 THE COURT: In fact, he did discuss, I believe,
15 saying that some that were packed in ice, the ice had melted,
16 was no longer present.

17 MR. BULLOCK: The data is that these samples that
18 were used were received in good shape and within the
19 temperatures.

20 THE COURT: The purpose for which the samples are
21 being used on page 2 of your brief is, you say, to add to
22 existing data collected by the State of Oklahoma and the USGS
23 regarding the extent of bacterial contamination in the waters
24 of the IRW and the percentage of samples that exceeded state
25 and federal water quality guidelines.

1 Well, to the extent that they violate the EPA hold
2 time standard, they ought not be used with regard to the extent
3 of bacterial contamination in the IRW in the percentage of
4 samples that exceeded federal water quality standards,
5 correct?

6 MR. BULLOCK: I don't agree with that. Now, I'm a
7 lawyer. The experts don't tell me that that's true. What the
8 experts tell me is that if I have a compliance action, I've got
9 to observe the six hours, but that in terms of looking and
10 determining the extent of bacterial contamination in a given
11 water body, these are valid samples.

12 THE COURT: Except you're bootstrapping onto a
13 compliance standard, a federal water quality standard,
14 correct? I mean, you're utilizing that standard in saying that
15 that standard has been violated.

16 MR. BULLOCK: Well, we are in terms of the water that
17 the people are swimming in; that's correct. But, for instance,
18 these -- the edge-of-field samples which we took, or the spring
19 samples that we took, residential wells, all of those, none of
20 those are the issue of the primary body contact, albeit those
21 standards may inform the -- use some as to how severe these
22 numbers are, but these are -- these samples are not the
23 violation. And so --

24 THE COURT: But you're using these samples to show
25 exceedance of the standards.

1 MR. BULLOCK: We're also using it -- more to the
2 point, what we're using it for is to show the way the bacteria
3 moves through the environment. And so we don't pretend that
4 anyone is swimming in the bar ditch next to the field. We're
5 not making any suggestion of that. That is not a piece of
6 water that is even considered for primary body contact. But
7 when we see these high levels coming off of those fields, and
8 understanding the issue that the hold times have, then that
9 helps to inform you as to the movement of bacteria.

10 High flow samples are similar. These high flow
11 samples were not. Our high flow samples were not on the main
12 stems of the rivers. These were back in the little creeks, the
13 little subwatersheds for the purpose of showing the way that
14 the bacteria moves through the watershed.

15 And so I don't think that they -- the defendant
16 should be allowed to mix apples and oranges here, when
17 Dr. Harwood says that -- and when we're talking about the
18 movement of bacteria through the watershed, these do exactly
19 what we said. These help to fill in the picture concerning the
20 extent and source of bacterial contamination in the watershed.

21 THE COURT: Line-drawing exercise. I mean, to the
22 extent you're saying, well, this shows bacterial contamination
23 at point A, regardless of the count, I'm assuming it does, in
24 fact, show that, correct?

25 MR. BULLOCK: But it's not only regardless of the

1 count. And, again, I think this is something that experts
2 ought to be opining on rather than lawyers.

3 Now, what -- the count is relatively important in
4 terms of these numbers. We're not -- and we put these forth,
5 the numbers that were -- or the values which were calculated,
6 those are -- we've put those forth as conservative numbers
7 because we recognize that they are going to go down, that
8 that's the trend for bacteria. So this is a conservative
9 number.

10 And my counsel just pointed out that in terms of the
11 EPA standards, the compliance standards that we're talking
12 about, those are standards for point sources and not for
13 ambient --

14 THE COURT: Why would it make any difference?

15 MR. BULLOCK: Well, because a wastewater treatment
16 plant will have very strict controls in terms of how much it's
17 going to dis -- how much it's allowed to discharge. And so if
18 the government was to wait 24 hours before measuring it, it
19 would be allowing that --

20 THE COURT: They may exceed their allowable.

21 MR. BULLOCK: That's right. You'd get the bias the
22 wrong way for protecting human health.

23 THE COURT: The same brother calculates the point
24 source allowables for the EPA.

25 MR. BULLOCK: Well, I should have expected as much.

1 So I think what -- and they just don't have any
2 science to explain this. They've drawn a bright line that's
3 unsupported. And without an analysis of what the data -- of
4 the data and an expert to interpret it -- and we know these
5 defendants are capable of having experts do the work that they
6 wish to do. And I presume that if, in fact, an expert would
7 condemn this data as not being fit for its use, we would see
8 that. But instead we get the very eloquent argument of
9 lawyers.

10 THE COURT: Does the EPA document that was referenced
11 explicitly limit itself to point source?

12 MR. BULLOCK: I believe it speaks in terms of
13 compliance issues. Let's have a lawyer that maybe is more of
14 an expert.

15 MS. FOSTER: I don't know about that, but I think it
16 speaks in terms of clean water -- I'm sorry, I'm Kelly Foster.

17 It speaks in terms of compliance with the Clean Water
18 Act, which is, as you may be aware, an act which applies to the
19 regulation of point source discharges and the monitoring
20 requirements associated with that.

21 THE COURT: Thank you very much.

22 MR. BULLOCK: If you have any nontechnical questions,
23 I'll be happy to answer.

24 THE COURT: Any lawyer questions?

25 MR. BULLOCK: Any lawyer questions, I can get a

1 spinoff.

2 THE COURT: Mr. Jorgensen.

3 MR. JORGENSEN: I'll be brief, Your Honor. First, as
4 to Mr. Bullock's point that he's got expert testimony about two
5 streams of data, some are samples that were taken by ODEQ
6 and/or USGS and complied, and a number were taken by the
7 plaintiffs in this case and don't comply, their experts, as
8 you've seen with the attachments that have been given to you --
9 although I pity you, Your Honor, because I do know there was a
10 lot of attachments -- but they fold those streams together.
11 You've seen some of the charts. You've already sat here and
12 seen some of the red dot/blue dot charts.

13 So I hear what you're saying to us today about the
14 practical limitations of what a judge can do. If you enter a
15 ruling today that says testimony will not come in that doesn't
16 comply with these standards, you don't have to go through and
17 pick out "and this Teaf chart is out and this Teaf chart is
18 in." The lawyers can sit down and say which of these, if any,
19 are based solely on USGS data that complies, which of these
20 fold the two together.

21 The problem is if an expert's got a chart that folds
22 in good data and bad data together and uses it, then you've got
23 a problem and that chart needs to be out.

24 Second, I am quite proud of the experts that we have
25 supporting us. And I've got nobody worse than the EPA to back

1 me up on this. So let me go through what I think was just
2 said, because it wasn't correct.

3 So this, 40 CFR Section 136, is the point chart --
4 point source discharges that were just talked about that when
5 bacteria come out of a point source, there are requirements and
6 EPA wants to know that the bacteria are being accurately
7 counted. And the way to accurately count them is to meet these
8 hold times. And you've seen the language. It's mandatory.

9 Let's go to the next slide, Mr. George.

10 If you'll look at the heading there, this is the EPA
11 improved enumeration methods for the recreational water quality
12 indicators. Totally different context. Same rule. If you're
13 going to scoop up water and send it off to a lab and count the
14 bacteria, we, the EPA, say, "Samples must not be analyzed" --
15 this is at the end there -- "if these conditions are not met."
16 So it's both point sources and it's scooping up water to test
17 for meeting the ambient standards.

18 This is the ODEQ chart. Let me point at the very top
19 there. Table 4.3, environmental microbiology, the drinking
20 water program. Mr. Bullock referenced that this standard would
21 not apply to drinking water wells. Well, it does. This is
22 the -- as you've sampled drinking water wells to show
23 compliance with standards that are set, this is the ODEQ's
24 chart. It says it right there.

25 I wish I could take credit, the credit Mr. Bullock

1 offers me for making this up, but I don't. In addition to
2 USGS, ODEQ and EPA, all saying this is mandatory, Dr. Myoda
3 does bring this point out, does analyze it, does talk about
4 it. It's in his PI report that was submitted to you. It's in
5 his final report, which is at Exhibit 10 to our brief.

6 Let me go to this idea that even though EPA and ODEQ
7 and USGS all use these standards and make them very mandatory
8 in all kinds of contexts, that maybe it doesn't apply here,
9 those are only for compliance for keeping people safe and that
10 this is for federal court. That's the argument that you've
11 heard.

12 First of all, there is not a lower standard of the
13 scientific validity for federal court. It either the same or
14 higher. And I wish I could take credit for that, too, but
15 instead, this is the Tenth Circuit. Rule 702 mandates that
16 experts should, "employ in the courtroom the same level of
17 intellectual rigor that characterizes the practice of an expert
18 in the relevant field."

19 If this is what -- the whole point of Daubert is, if
20 this is what people do when the lawyers have gone home because
21 they're doing compliance, then that's what needs to be done
22 here in court. It's a higher standard or the same standard,
23 not a lower standard for federal court.

24 And to your point, the whole hook here is, is
25 compliance with these various standards and risks.

1 There was a reference made --

2 THE COURT: Let's take a short recess, and we'll be
3 back. Is there a separate motion in limine on this or is this
4 issue only raised in the context of excluding expert testimony?

5 MR. JORGENSEN: This is the kind of testimony that
6 could not come in, in my opinion, other than through an
7 expert. So it needs to come up here. If you disagree on that,
8 we'll be happy to file a motion in limine, but the deadline
9 hasn't come yet.

10 THE COURT: Just curious.

11 MR. JORGENSEN: Thank you, Your Honor.

12 (Whereupon a recess was had.)

13 THE COURT: Be seated. Mr. Jorgensen.

14 MR. JORGENSEN: I think I've taken enough time, Your
15 Honor. Thank you.

16 THE COURT: Any rejoinder?

17 MR. BULLOCK: Judge, the only thing I would point out
18 is that in one of those last slides that they showed to the
19 Court relating to drinking water, the hold time for E. coli was
20 30 hours.

21 THE COURT: It was the state standard. It wasn't E.
22 Coli; it was enterococci, wasn't it?

23 MR. JORGENSEN: It's still up on the screen, Your
24 Honor. I'll just go there so that we don't have any confusion.
25 It's total coliform, but look one up; it's not fecal coliform.

1 Fecal, which is what this case is about, is 6. Total, which
2 concludes coliforms that live on plants, is 30.

3 THE COURT: Well, but E. coli as well down at the
4 bottom. He's right.

5 MR. JORGENSEN: E. coli is up at the top. There's a
6 special footnote there on the bottom one. See that?

7 THE COURT: What is LT2 enumeration? Can any lawyers
8 answer that question?

9 MR. BULLOCK: I guess -- that just is the sum of my
10 argument, is that if we're going to interpret these technical
11 matters, we should have somebody that actually has some
12 expertise in them. The record before the Court is clear.

13 THE COURT: Thank you. With regard to the Daubert
14 motion on Cowan, which is No. 2072, the Court finds and
15 concludes that he is a qualified statistician and does not
16 require experience in watershed modeling to testify.

17 The reasoning and methodology underlying Cowan's
18 statistical testimony is mathematically valid and can properly
19 be applied to the facts and discipline in issue. That
20 reasoning as set forth may be considered in connection with the
21 issue of whether the number of samples here was sufficient.

22 As to the motion to exclude the testimony of
23 Dr. Valerie J. Harwood, No. 2030, Dr. Harwood's methodology
24 arises out of the novelty of its application to an entirely new
25 area which required the development of primers that had not

1 been previously identified. The methodology is untested and
2 was devised solely for this litigation. No scientist has
3 previously identified any type of bacteria or a specific strand
4 of DNA that is unique to poultry litter. The novelty of the
5 method is not the use of PCR; rather, it is the claim that
6 these newly designed primers isolate and reproduce a strand of
7 DNA carried by bacterium unique to poultry litter.

8 Dr. Harwood's methodology has been twice rejected by
9 peer reviews, specifically the Journal of Applied and
10 Environmental Microbiology for scientific reasons. The
11 reviewers specifically noted, "the biased language."

12 Moreover, number one, the biomarker was developed
13 without adequate confirmation of its absence from other
14 species. The conclusion assumes the absence of the biomarker
15 from animals other than poultry. The peer reviewers criticized
16 Dr. Harwood's failure to include sufficient control samples to
17 show that the biomarker is not normally found in at least some
18 soil and runoff without the presence of poultry litter.

19 Number two. The biomarker does not correlate with
20 indicator bacteria. Although Dr. Harwood reports that the
21 biomarker correlates strongly to enterococci and positively
22 with E. coli, she made no effort to show that the biomarker and
23 the indicator bacteria maintain a correlation during land
24 application on field surfaces, in runoff waters, in the river,
25 in groundwater, in wells, and in recreational waters or any of

1 the above.

2 Plaintiff did not study the fate and transport
3 characteristics -- or, rather, Dr. Harwood -- of the bacterium
4 or any other bacterium in the IRW.

5 Given the alternate sources for fecal indicator
6 bacteria and potential alternate sources of the biomarker, the
7 assumption that the correlation is maintained from chicken
8 house to recreational waters is unreliable.

9 Number three -- or -- and related thereto.

10 Number three. The theory is not substantiated by
11 traditional fate and transport study. The bacterium --
12 specifically that the bacterium moves in the environment at the
13 same speed as fecal bacteria in poultry waste. Thus,
14 Dr. Harwood fails to analyze whether the fecal bacteria found
15 in conjunction moved together with the brevibacterium from
16 poultry litter or were from other sources.

17 Number four. The poultry-specific biomarker is not
18 specific to poultry. Plaintiffs found the same genetic
19 sequences in geese and ducks. They found it in every bird
20 species they tested.

21 Dr. Harwood does not yet know whether her DNA
22 sequence is carried by other species of brevibacteria or other
23 types of bacteria found in the IRW or how many other species in
24 the IRW carry the bacteria.

25 Dr. Myoda isolated the biomarker in other materials:

1 Unused bedding material, other water foul samples, and cow
2 hide. Importantly, the biomarker's ability to persist for long
3 periods of time suggests that a scientist cannot discount the
4 need to test other nontarget fecal sources.

5 Peer reviewers from the Journal of Applied and
6 Environmental Microbiology noted Dr. Harwood's failure to
7 account for alternate sources of bacteria.

8 Number five. The biomarker process and conclusions
9 are inconsistent with applicable statistical standards, as
10 Dr. Cowan explains, without more sampling, which apparently
11 Dr. Harwood is continuing to do, and it is an important area,
12 but the tests prove without more sampling, neither the presence
13 of the biomarker generally in poultry nor the absence of the
14 biomarker in other species.

15 In addition, the plaintiffs developed the biomarker
16 from only two samples gathered from proximate locations, which
17 increases the likelihood that the samples will be similar.

18 Number six. Dr. Harwood failed to account for
19 alternate sources of fecal indicator bacteria, which I've
20 already discussed. But as one peer reviewer put it, "the
21 analysis of relationships between E. coli or enterococci
22 density and putative poultry marker concentration in water is
23 incomplete."

24 In any given water sample, fecal contamination from
25 any number of sources may be present. Thus, any validation for

1 a relationship between poultry marker and fecal indicator must
2 take into account the expected level of poultry contamination.

3 Dr. Harwood's conclusions regarding risks to human
4 health in the IRW from fecal indicator bacteria from poultry
5 litter are unsupported by the data.

6 For instance, 80 percent of campylobacter illness and
7 95 percent of salmonella illness is food borne, not
8 waterborne. Moreover, as one peer reviewer stated, "The
9 relationship of fecal indicators with human health risk was
10 developed at sites contaminated primarily with human waste.
11 This relationship is not expected to be the same for water
12 contaminated with feces from nonhuman sources." That's from
13 the peer review.

14 In contrary to the argument that Dr. Harwood reached
15 her health risk conclusion independent from her work on the
16 biomarker, her Rule 26 report recognizes that the biomarker is
17 her link between poultry litter and allegations of health risk
18 from human pathogens such as salmonella and campylobacter.

19 Moreover, Dr. Harwood's proposed article stated that
20 the magnitude of the impact cannot be quantified with the
21 limited number of environmental samples processed.

22 Now, that still raises the issue and does not address
23 the issue raised by Mr. Page as to whether she might be able to
24 testify to other more generalized health risks from fecal
25 indicator bacteria, and I'm not deciding that here today.

1 Finally, the hold times that Dr. Harwood relies upon
2 for nearly three-quarters of the water samples failed to comply
3 with the EPA mandated six-hour hold time limits for enumerating
4 bacteria in recreational water samples. The 1953 English study
5 that Dr. Harwood cites states that hold time violations can
6 bias the enumeration either up or down, based upon prevailing
7 conditions.

8 Now, finally, I need to rule on 2090. I'll take a
9 short recess and put those thoughts together and will be back.

10 (Whereupon a recess was had.)

11 THE COURT: Before we address 2090, what are your
12 thoughts with regard to what the record should show in the
13 minute relative to the Harwood motion? Mr. Overton, who's done
14 this longer than any of us and knows how this is done better
15 than any of us, said, well, Judge, I heard you saying it was
16 granted in part and denied in part. And to the extent that it
17 does not completely foreclose Harwood testimony in the nature
18 of the topics that Mr. Page raised, that would be correct. We
19 haven't addressed these other issues.

20 Mr. George.

21 MR. JORGENSEN: Your Honor, we believe that's a
22 reasonable docket entry for that motion.

23 THE COURT: All right. We'll do that. We'll show
24 that motion granted in part and denied in part.

25 After putting something together on 2090, I think the

1 best way to approach 2090, the subject matter there, is to
2 address those issues that were briefed and argued here in the
3 context of each of the individual expert witnesses, because I'm
4 not certain that in and of itself that that hold time violation
5 ought to preclude testimony of those three experts.

6 So with due respect, I'm going to show the motion
7 number 2090 as moot insofar as we'll address those issues in
8 the specific context of the Harwood, Olsen and Teaf motions.

9 Anything else we can address tonight? I'm afraid if
10 we went any longer, the crew would mute me. So tomorrow
11 morning, we will start off with Olsen, Murphy, Johnson, Cowan,
12 or do we want to take up Grip, Davis, Clay and Churchill? My
13 understanding is we were going to go with Olsen and that group,
14 correct?

15 MR. PAGE: Whatever the Court prefers, Your Honor.

16 THE COURT: Well --

17 MR. PAGE: I think there are two separate groups, and
18 I think you've got them grouped properly.

19 THE COURT: Yes. I think we were going to address
20 PCA and then assess the Teaf, McGuire, Sullivan group, right?

21 MR. PAGE: I think that's what we mentioned on the
22 phone the other day.

23 THE COURT: All right. We'll start off tomorrow with
24 Cowan, Murphy, Olsen and Johnson in no particular order,
25 whichever you'd like to address first.

1 All right. We'll be adjourned until tomorrow morning
2 at 9:30.

3 (Evening recess was had.)

4 REPORTER'S CERTIFICATE

5 I CERTIFY THAT THE FOREGOING IS A TRUE AND CORRECT
6 TRANSCRIPT OF THE PROCEEDINGS IN THE ABOVE-ENTITLED
7 MATTER.
8

9
10 S/Terri Beeler
11 Terri Beeler, RMR, FCRR
12 United States Court Reporter
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